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VOL. XII. No. 2. FEBRUARY, 1921 $4.00 a year. 60c. per copy.

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*Published Monthly Except June to August by*
*WARWICK and YORK, Inc., Baltimore, Md.*

Entered at the Baltimore (Md.) Postoffice as second-class mail, January 24, 1921.

# The Journal of Educational Psychology

**is published monthly, except June, July and August, by Warwick & York, Inc., 10 E. Center street, Baltimore, Md. The issues of 1921 make Volume XII.**

**Manuscripts for publication, books or other materials for review and news items should be addressed to Harold Ordway Rugg, Chairman of the Editorial Board, 59 Edgecliff Terrace, Yonkers, N. Y.**

**The price of the Journal is $4 a year in advance. Foreign postage is 30 cents extra. Single issues are 60 cents each, and less than a full year's subscription is charged at single-issue rate.**

**Subscribers should notify publishers of changes in address at least four weeks before publication of the issue with which change takes effect.**


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THE JOURNAL OF
EDUCATIONAL PSYCHOLOGY

Vol. XII FEBRUARY, 1921 No. 2

# EDUCATIONAL PSYCHOLOGY AT THE CHICAGO MEETINGS OF SCIENTIFIC SOCIETIES

ARTHUR I. GATES,
Teachers College, Columbia University.

The American Psychological Association, Section I (Psychology) and Section Q (Education), of the American Association for the Advancement of Science held their annual meetings jointly at the University of Chicago, December 28-30, inclusive. The attendance was unusually large and the programs were more than normally extensive. Some notion of the interest displayed in educational psychology is given by a classification of the papers offered. Aside from the addresses of retiring officers, eighty papers were read, and of these one-half were either studies of educational problems or studies which could be directly applied to education. Twenty-seven titles dealt in particular with tests; general psychology claimed eight titles, experimental nineteen, comparative four, social four, clinical nine, and industrial six.

V. A. C. Henman, University of Wisconsin, retiring vice-president of Section Q, in an address, "The Measurement of Intelligence," reviewed past accomplishments and evaluated the present status of testing. "The conspicuous development in the application of scientific method to educational problems during the past two years has been the construction and use of intelligence tests in schools and colleges." "What we have learned about the influence of environment on mental traits and the failure of environment to alter them materially; what we are now learning about the constancy of the intelligence quotients, and the fact that mental alertness is given like retentiveness once for all with one's native constitution, magni-

fies the function of the school in selecting individuals and minimizes its function in training them." The teacher is to become a "diagnostician and director" rather than a "trainer." Classification by mental age and "sectioning" on the basis of the I. Q. were urged. However, "tests are greatly needed of ability to deal with things and other human beings, what Thorndike calls mechanical and social intelligence." Finally, the misuse of tests in schools and elsewhere and the present tendency toward multiplication of group tests, partly due to the urge of publishers, were criticised. What we need is not more tests, but refinement, standardization, and analysis of a few.

C. H. Judd, speaking at a symposium in "Problems of Psychology," criticises the current practices of mental and educational testers who are often "content to let tests be tests, and linger on the outskirts of real science." "The practices of testing are running far ahead of the explanatory science." The necessity of refinement of tests was urged, and likewise the need of analytical work. A test in reading, e. g. is made, a median and coefficient of correlation given, but the tester, and above all, the teacher has but a vague idea of what it all means. It was urged that more adequate preparation in experimental and scientific technique be acquired by students, that the limitations of statistical procedure be made clear, that more interest be centered on analytical problems, and, that most of all, the development of the explanatory science should be furthered.

Views, more or less in harmony with those of Judd, were expressed in open discussion by Raymond Dodge, Robert M. Yerkes, Joseph Jastrow. W. S. Hunter, and others, and it became apparent early in the meetings that the relation of the practice to the science of psychology, particularly in connection with tests, would be the outstanding discussion of the convention.

F. N. Freeman, University of Chicago, in an important paper, took up our lack of information concerning the curve of mental growth, and the questionable practice of estimating and applying the 'Intelligence Quotient' from point scales. For the I. Q. to be valid, the rate of growth must follow a logarithmic curve, producing a constantly increasing amount of overlapping from year to year or a straight line curve, which likewise produces increased overlapping. An examination of the results of recent group intelligence tests indicated that the use of the intelligence quotient was a very question-

able procedure. The need of empirical work in the technique of test construction and interpretation was emphasized.

M. E. Haggerty, University of Minnesota, in a paper, "The Essential Criteria of Mental and Educational Tests," urged a more careful evaluation of the units of "battery" tests, and the publication of detailed statistics upon which tests are based. Tests are thrown upon the market without proper standardization; at least, the data for the test units are not made available. Critical study of certain tests shows parts or the whole of certain tests to be of doubtful value. The publication of both age and grade norms was advocated.

Rudolf Pintner, Ohio State University, illustrated a frequently misleading practice of measuring educational attainments in schools, basing recommendations upon them when the intellectual status of the pupils is not known. Classes and schools differ very greatly in capacity to profit by instruction; measures of attainment are meaningless unless supplemented by intelligence scores. A group test, measuring both general intelligence and school attainments, which may be given in a short time with results sufficiently accurate for school surveys was described.

Throughout the meetings there was an active interest in defining more exactly the uses, and especially the limitations, of numerous educational and mental tests. The need of more careful evaluations of the existing tests, more satisfactory standardization and more cautious interpretation of results was constantly emphasized. That intelligence ratings are more useful when supplemented by measures of other traits, physiological, emotional, temperamental, and that these features may yield to quantitative treatment by practicable methods was indicated by the contents of several papers.

Bird T. Baldwin, University of Iowa, found it useful to supplement intelligence ratings with measures of certain anatomical traits which give an index of physiological maturity. Physiological age has a direct bearing upon emotional traits, social relations, and pedagogical advancement. Questions of rapid promotion, it was urged, should be settled on the basis of physiological maturity as well as mental maturity. In general, there is a good correlation between physiological age and mental age, but occasionally the disparity is significantly great. Height, weight, and radiographs of the carpal and metacarpal bones are indicative of physiological maturity.

June E. Downey, University of Wyoming, devised a group test, including many features of the original individual test, of the will-temperament, for use with students from the seventh grade through college. The group test is less valuable than the earlier for refined results, but yields certain information concerning motor impulsion, co-ordination of impulses, etc., which is a useful supplement to an intelligence rating. Patients suffering from various mental disorders present characteristic will-profiles. M. J. Ream, Carnegie Institute of Technology, constructed a group test using many of the Downey devices which gave fair correlations with success in salesmanship.

A scheme for describing by contrasts, the interests of an individual, was set forth by J. B. Miner, Carnegie Institute of Technology. Standard psychographs for both sexes, and for students in different types of courses, were shown. The plan was proposed as useful in helping the youth to discover the vocation which approximate his complex of interests.

*Results from the Use of Tests.*— J. W. Bridges, Ohio State University, found correlations averaging + 0.36 between academic grades and point scores on the Army Alpha with a group of nearly 6000 college students. Variations of correlations with sub-tests indicated that there should be specific tests for students of different colleges; engineering, etc. William F. Book, Indiana University, in a study of over 6000 high school seniors, found that approximately the same percentage of dull, average, and bright students intended to go to college. Twenty-two per cent. of the brightest students expected not to go to college. Dull students preferred professional or technical college courses, the bright desired liberal arts more frequently. James P. Porter, Clark University, suggested certain methods of analyzing the mental aptitudes and inaptitudes of adults by detailed examination of relative success in sub-tests of the Otis and Thorndike series. L. L. Thurstone, Carnegie Institute of Technology, found the predictive value of his thirty-minute intelligence test for engineering students to be equal to the records of scholarship for four years in high school. The predictive value of the test was higher in liberal arts colleges and normal schools than in engineering schools. J. E. W. Wallin, St. Louis, finds the judgments of teachers about as reliable as a group intelligence test (Pressey Primer) for selecting mental defectives; the Stanford-

Binet being more reliable by far than either. H. H. Goddard discussed various features of abnormal functioning of the mind, upon which little light is thrown by intelligence tests.

Lewis M. Terman, Stanford University, reported on the progress of a study of nearly 100 children of superior ability. Ratings on forty-six mental, moral, and physical traits, as well as intelligence measures, are being secured annually. Results so far indicate a constancy of the I. Q. with a few changes of considerable magnitude. Ratings on social adaptability show a tendency to improve as the child matures. Some details concerning Betty F., a gifted juvenile author, I. Q. 188, who had not attended school at eight, but had read 750 books and written enough verse and prose to fill a fairly large volume, were given.

President Walter Dill Scott, Northwestern University, speaking on "Psychology in Industry," urged the development of vocational tests for the placement or selection of men rather than the mere elimination of the unfit. Data were presented showing the influence of intelligence level upon contentment with different jobs. With a certain optimum and intelligence, the man "likes" the job, whereas a man of higher intelligence finds it monotonous, and a lower intelligence finds it too exacting.

Walter S. Hunter, Kansas University, measured 715 American Indians of full and partial breed, finding a median Otis score of 82.6, as compared to a score of 122.6 for 1366 native whites of equal age. With comparable groups, it was found that intelligence varied positively with degrees of white blood possessed by the Indians. Thomas R. Garth, University of Texas, in tests of 371 Indians, found a similar relation of intelligence to blood, but was unable to entirely eliminate variations in educational advantages among the groups.

S. A. Courtis, Bureau of Statistics, Detroit, presented the results of an age-grade survey of Detroit schools, in which children were classified by nationalities, grades, and schools. Retardation rises to a peak at the fifth grade, falling to a minimum at the eighth. Acceleration increases gradually to the eleventh grade. On the whole, the greatest retardation is found among negroes and Italians; the greatest acceleration among United States whites, Scotch, and Russians.

Ada Arlitt, Bryn Mawr College, presented data showing that native whites surpass slightly in Stanford I. Q.'s Italians and

negroes of similar social status. Dividing all subjects into five groups according to social status, the I. Q.'s of each average 125.9, 118.7, 106.5, 87.0, and 83.4. Karl T. Waugh, Berea College, presented a comparison of Oriental and American student intelligence ratings which could not be attributed securely to racial differences.

Buford Johnson, Johns Hopkins University, found that children from 8 to 20 per cent. under weight, according to present norms, perform as well in mental functions as children of normal weight when other conditions, especially intelligence level, are equal. Children 8 or 9 per cent. below the norm in weight grow at standard rate in weight, whereas those from 10 to 20 per cent. below the norm show less than the expected gain.

*New Educational and Mental Tests.*—A group intelligence scale for the primary grades, pictorial in character and involving no reading, writing, or complicated drawing, was devised and standardized tentatively by Forrest A. Kingsbury, University of Chicago. The test yielded an average correlation coefficient of + 0.69, with the Stanford-Binet Mental age of 1300 primary pupils. A convenient, combined mental-educational test, for survey work, has been devised by Rudolf Pintner, Ohio State University, and standardized on 4300 cases. It affords a measure of the mental status of a class, and provides a convenient means of evaluating educational attainments in terms of innate ability to profit by instruction. Sidney L. Pressey, Indiana University, presented a new scale for measuring attainments at the end of the 7th grade, in history, reading vocabulary, English composition and arithmetical reasoning. English composition was measured by the novel method of scoring the accuracy of children's judgments of compositions of known value.

*Experimental and Statistical Studies of School Subjects.*—Shepherd Ivory Franz, in the presidential address, discussed the need of work in analytical psychology in the interests of psycho-pathology, and for the solution of problems concerning the relation of mind and body. The brain pathologists and the histologists are hampered by lack of information concerning the structure and correlation of mental states, e. g., the nature and function of imagery, of perception, etc. A review of recent cases of abnormalities in behavior with the corresponding brain lesions was offered, illustrating, in particular, the need of a more useful analysis of mental activities. In the first session on educational psychology, a similar need

of analytical work to define the mental processes involved in school functions was emphasized, both in formal papers and in informal discussion. That the mental processes involved in school subjects may be profitably attacked with the technique of the laboratory was illustrated in several papers. A movement toward a return to analytical studies by experimental methods would be heartily approved by many.

G. T. Buswell, University of Chicago, reported a commendable study of oral reading. By an ingenious method graphic records of the positions of eye and voice in reading were obtained. The better reader has a better eye-voice span, which is characterized by several variations from that of the poor reader. Such analytical studies pave the way for an effective method of instruction in reading. W. S. Gray, University of Chicago, gave details of an analytical diagnosis of a case of backwardness in reading, in which the difficulty was discovered and remedied by appropriate training. Paul West, University of Chicago, by the use of photographic apparatus, determined certain characteristics and conditions of motor rhythm in writing movements. Essentially speed and rhythm are determined by the radial length of the arc inscribed in writing. Certain rhythmic drills in the case of children backward in writing were found to be useful.

Drawing ability of 725 children, determined by the use of standardized scales, was found to yield a correlation of 0.83 with tests of visual memory, and a correlation of 0.82 with tests of perception of perspective, devised by Elmer E. Jones, Northwestern University. The two tests gave a coefficient of 0.69.

The results of measurements of spelling, in the Virginia Survey, were presented by Frederick S. Breed, University of Chicago. Rural schools were from 2.7-3.8 years, and city schools, 2.0-3.2 years below the achievement of representative American eighth grade systems.

Luella W. Pressey, Indiana University, devised four tests of silent reading, two based on general press literature, one on scientific passages, and one on poetry. It was found that the tests on general matter gave a correlation of 0.85, but that the coefficients with reading poetry were 0.38 and 0.31, respectively, and 0.35 and 0.49 with scientific material. Proficiency in reading poetry and scientific material is correlated + 0.56. "It suggests that 'silent

reading ability' varies with the type of matter used; and, that if may (after freedom from oral reading habits has been achieved) be a composite of general ability, background information in the subject dealt with, and interest. Measurement of 'silent reading ability' in the upper grades, or teaching directly toward the improvement of 'silent reading ability' as an entity, would hardly seem warranted under such circumstances."

E. K. Strong, Carnegie Institute of Technology, in his address as retiring vice-president of Section I, urged that courses in vocational education be built, not upon opinions of university men or industrial executives as heretofore, but upon the results of actual job analyses. An outline was given of the technique of job analysis which consists essentially of discovering: (1) what an executive does; (2) what he must know in order to do it; (3) other abilities valuable but not necessary; (4) the progress of successful workers.

*Studies of Learning in Laboratory Functions.*—Joseph Peterson, George Peabody College, in studies of maze learning by human subjects, found that "learning seems to be possible only by the overlapping of the effects of successive stimuli, in accordance with the principle of "completeness of response," when frequency and recency factors are made negative. John F. Shepard, University of Michigan, described new forms of maze apparatus for human and animal subjects. Katherine Ludgate, University of Chicago, found that guidance of the learner's hand through a maze in the first attempts shortened the total time required to learn.

Distributed practice in memorizing digits is more fruitful, as a rule, than concentrated learning, according to experiments of Edward S. Robinson of Chicago University. Certain sex differences, generally in favor of men, in the case of mirror tracing, appeared in a study made by George S. Snoddy, University of Utah. A detailed study of interference effects of card sorting, pencil mazes, etc., was reported by J. F. Dashiell, University of North Carolina. Stevenson Smith, University of Washington, discussed the mechanism of trial and error learning of animals. L. A. Pechstein, University of Rochester, found, with both human and animal learners, that massed learning, when the maze is new and short, is to be preferred to distributed effort. In certain cases, long problems were best learned by massed attack upon parts.

Augusta F. Bronner, Judge Baker Foundation, has devised a series of learning tests for practice work which involve functions comparable to school subjects. That school children are woefully ignorant of efficient methods of studying was the finding of an investigation by A. S. Edwards, University of Georgia.

*Business Transactions.*—Of importance to educators and psychologists alike was the report of Bird T. Baldwin, chairman of the Committee on Qualifications and Certification of Consulting Psychologists. The report, approved by the Clinical Section of the A. P. A., and by the Association as a whole, provides for the standardization of academic and professional equipment of clinical psychologists, for examinations, and for a written testimonial to be given to successful candidates. The action was taken as a means of protecting the public from ill-equipped practitioners until the States shall provide boards to pass upon the fitness of professional workers in psychology and shall issue certificates. A model bill to assist legislation in the States was drawn up by the committee.

C. E. Seashore, University of Iowa, reported for the committee on a journal of abstracts of psychological literature. Final action was not taken, but it is likely that the "Psychological Bulletin" will be converted into a six-issue journal, containing abstracts of the literature of all languages. At present, the technical literature of psychology is too widely scattered to collect, too expensive to purchase, and too voluminous to read in the original. An organ to serve as a clearing house of literature, especially that of foreign origin, is very much needed.

The following are officers-elect for the American Psychological Association for 1921:

President, Margaret Floy Washburn, Vassar College. Members of Council—G. F. Arps, Ohio University, and W. S. Hunter, University of Kansas. G. M. Stratten, University of California, and W. B. Pillsbury, University of Michigan, were elected representatives to the Natural Research Council. E. K. Strong, Carnegie Institute of Technology, was elected representative to the Council of the A. A. A. S. G. M. Whipple, University of Michigan, was elected chairman of Section I (Education) of the A. A. A. S. Thirty-nine candidates were admitted to membership in the A. P. A. The A. A. A. S. will meet in Toronto in 1921, but the place of meeting of the A. P. A. has not been selected.

# A SURVEY OF THE THREE FIRST GRADES OF THE HORACE MANN SCHOOL BY MEANS OF PSYCHOLOGICAL TESTS AND TEACHERS' ESTIMATES, AND A STATISTICAL EVALUATION OF THE MEASURES EMPLOYED.

CLARA F. CHASSELL,
Psychologist of the Horace Mann School, Teachers College, Columbia University.
and
LAURA M. CHASSELL,
Instructor in Psychology, Ohio State University.

The practice of making chronological age almost the only basis of admission to the first grade, and the tendency to promote by age rather than ability, are the two factors which help most to forge the chains of our fatal lockstep system of classification and promotion. Its hold upon our more gifted children is shown by the fact that, although the distribution of intelligence follows the normal curve, there are approximately 10 times as many retarded pupils as accelerated ones in the schools. However much we may deprecate the disregard of individual differences which this system implies, no perfect method of classification and promotion has as yet been devised. The problem is still in the experimental stage.

The following study, which presents the results of a survey of the three first grades of the Horace Mann School, is concerned with this problem. Part I indicates the need for the survey, reports its general method and results, and suggests a plan for utilizing the data thus secured for purposes of reclassification. Part II[1] records the correlations obtained between the various measures employed in the survey, evaluates these measures, and gives a detailed account of statistical precedure.

## PART I. THE NEED FOR THE SURVEY; ITS METHOD AND RESULTS

*The initial composition of the three first grade groups.*—Although in the provision of three first grades the Horace Mann School has administratively available the facilities for a relatively homogeneous classification of entering children, previous to the survey described in this article no carefully standardized procedure for this purpose had been developed.

[1]Part II is to appear in the next issue of the *Journal*.

In general, children entering from the Teachers College kindergarten were placed in one of two classes, for convenience in this article designated as Class A and Class B, respectively, children of less maturity and ability to co-operate, as judged by the kindergarten teachers,[2] being placed in Class A, and those of more, in Class B. To the third first grade, designated as Class C, were assigned the children entering from the outside. Wishes of parents or accidental factors, such as a vacancy in one of the rooms, also might determine assignment. Moreover, Class C was designed to prepare a certain number of its pupils for third grade work. Hence, children of unusual maturity and ability, or of some previous school training, or children who had failed of promotion, were included in its constituency.

The unstandardized basis of selection thus resulted in considerable variation within a given class in chronological age, general intelligence, intellectual maturity, ability to make social adjustments, as well as in entirely unnecessary overlapping among the classes. Experimental instruction with the project method as a basis, and the giving of special attention to the development of desirable habits and attitudes, complicated the task of the teachers. Hence some means of reducing the heterogeneity of the individual classes seemed imperative, and a survey and comparative study of the three first grades was undertaken.

*The data secured in the survey and their quantitative treatment.*— In making the survey two kinds of data were assembled: (1) the results of psychological tests, both individual and group; (2) teachers' estimates.

The psychological tests comprised, as the individual test, the Stanford Revision of the Binet-Simon Tests, and, as the group tests, the Pressey Primer Scale and the Meyer Tests. The individual psychological examinations and the Primer Scale were given by the writers. Children who had previously been examined in the kindergarten by means of the Stanford Revision, as a rule, were not retested. The Meyer tests were administered by their author, Miss Helen Meyer.[3] The teachers' estimates were rankings of their own

[2] In making these judgments the kindergarten teachers were doubtless influenced to a certain extent by the results of the Standard Revision of the Binet-Simon Tests, which had been given to many of the children.

[3] The Meyer Tests used in this survey should not be confused with the Myers Mental Measure constructed by Caroline E. Myers and Captain Garry C. Myers, also used for examining first grade children. For an account of the Meyer Tests, see an unpublished thesis, "Group Tests for Grades I and II," by Helen Meyer, on file in the Columbia University Library.

pupils in maturity and in ability in reading, the interpretation of the former trait being left to the teacher. There were thus available a maximum of five separate measures for each child: the Terman mental age, the score on each of the two group tests, and the teacher's ranking in two traits. These measures were subsequently incorporated into a composite score, each individual measure in this composite being given equal weight with the exception of the Terman mental age, which was doubled.[4]

The incorporation of such varied data in a single quantitative measure involved the reduction of all measures to a common basis. The one selected for this purpose was that of mental age. The scores in the various tests and the rankings of the teachers were converted accordingly. By the use of a more or less complicated statistical procedure[5] the five resulting mental ages, weighted as previously indicated, were then added, and the average mental age found. This average mental age was the composite score finally employed.[6]

*A comparative study of the three first grade groups.*—The survey revealed, as had been anticipated, wide variation in the mental maturity of the children, their native intelligence, and their chronological ages, and a striking amount of overlapping among the three classes. The extent of this variation and of the overlapping will be apparent in Tables I, II, III, and IV.[7]

Table I presents the data relative to mental age. Here are given for each class the median mental age found by each of the measures employed, including the composite, and the lowest and the highest mental age, with the corresponding range covered in each instance.

Since mental age as indicated by the Stanford Revision is being

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[4]These weightings were adopted after a consideration of coefficients of reliability for the different measures; they are reported in Part II.

[5]Described in Part II.

[6]When fewer than five measures were available in the case of individual children, the composite score was obtained from the smaller number, provided the available measures included the Terman mental age.

[7]In the first three tables the data relative to the variability and degree of overlapping are indicated merely by the lowest and the highest figure found for each item, the range between the lowest and the highest figure, and the medians. Table IV, however, presents by classes the total distribution of the individual children in respect to the most significant measures employed. For this reason it was thought unnecessary to compute the precise amount of variation and overlapping by refined methods, especially in view of the fact that however unsatisfactory range is from the statistical standpoint as a measure of variability, it is of very great practical significance for the purposes of our study. The "extremes" in our data imply acute maladjustment on the part of actual children, which, in view of the relatively little attention given by teachers to the problems resulting from individual differences, can scarcely be too much emphasized.

TABLE I.

DIVERGENCES IN MENTAL AGE.

| | Median Class | | | Lowest Mental Age Class | | | Highest Mental Age Class | | | Range Class | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C | A | B | C |
| Stanford Revision..... | 7-4 | 7-11 | 7-5 | 5-11 | 6-1 | 6-6 | 9-8 | 9-3 | 9-3 | 3-9 | 3-2 | 2-9 |
| Pressey Primer Scale.... | 7-6 | 7-6 | 8-4 | 6-1 | 5-10 | 6-7 | Above 10-6[8] | Above 10-6 | Above 10-6 | More than 4-5 | More than 4-8 | More than 3-11 |
| Meyer Tests..... | 6-9 | 7-4 | 8-2 | 5-6 | 6-2 | 5-11 | 8-3 | Above 9-0[8] | Above 9-0 | 2-9 | More than 2-10 | More than 3-1 |
| Teacher's Ranking in Maturity ..... | 7-4.5 | 7-10.5 | 7-8 | 5-7.5 | 6-3 | 5-10 | 9-1.5 | 9-6 | 9-3 | 3-6 | 3-3 | 3-5 |
| Teacher's Ranking in Ability in Reading..... | 7-4.5 | 7-10 | 7-10.5 | 6-2 | 6-6 | 6-6 | 9-0.5 | 9-0 | 9-3 | 2-10.5 | 2-6 | 2-9 |
| Composite ..... | 7-5 | 7-11 | 7-10.5 | 6-3 (Rank 67) | 6-5 (Rank 66) | 6-8 (Rank 64) | 8-10 (Rank 6.5) | 9-3 (Rank 1) | 9-2 (Rank 2) | 2-7 (60.5) | 2-10 (65) | 2-6 (62) |

[8]The highest mental age utilized in the table for converting scores in this test into mental ages.

considered in an increasing number of schools, the most important single factor for the placing of school children, the data in regard to this test are of especial significance. It is at once seen from a consideration of the medians and the extremes in ages for the three classes that the overlapping is almost total; moreover, that the average range for the three classes is approximately 39 months, and that in one class alone appear the extremes in mental age for the total group. That the great variability shown by the range between the extreme measures is characteristic of the group as a whole is confirmed by the standard deviations, which are for the three classes, 10 months, 8.5 months, and 10 months, respectively. Such variation in mental maturity is not more than could naturally be expected in a first grade; that it should be distributed apparently without reference to class groupings is the striking fact.

The evidence with reference to overlapping presented by the Stanford Revision is further supported by the data secured from the other tests and the teachers' rankings. The facts given by the composite, which takes into account all of the measures, are of most importance; they are also in essential agreement with those presented by the Stanford Revision, though the divergences found in mental age are less.

The rank numbers corresponding to the extremes of composite mental age in each of the rooms are especially convincing. A total of 67 children was ranked by means of this measure. Reference to the table shows that Class A included children ranking from 6.5 to 67; Class B, from 1 to 66; and Class C, from 2 to 64. Greater overlapping than these figures show is thus almost impossible.

The range in composite mental age for the entire group, regardless of grade, is three years, extending from six years, three months, to nine years, three months. The median mental age, this same measure being used, is seven years, nine months.

In Table II are given the data for intelligence quotients similar to the data already tabulated for mental age, although less complete, since intelligence quotients were calculated only on the basis of the mental ages derived from the Stanford Revision and from the composite. The variation in native intelligence of the children, as shown by the intelligence quotients, is more clearly indicative of mal-adjustment than the divergences in mental age. If the range in Terman intelligence quotients of the class which is the most

variable be considered, namely, 61, it is at once evident that a difference is found here which is as great as that between definite feeble-mindedness and very superior intelligence—a difference which is rendered none the less serious by reason of the fact that the variation falls in this instance between the limits of the lower ranges of normal intelligence and genius. The difference in the second group is scarcely less. Moreover, if the extremes in the composite intelligence quotients for each class, which are, perhaps, of even greater significance than the Terman, be considered (102 and 147 for Class A, 86 and 139 for Class B, and 94 and 130 for Class C) variations in intelligence in the three groups from normal intelligence to genius, from dullness to the upper ranges of very superior intelligence, and from the lower ranges of normal intelligence to very superior intelligence, respectively, are seen to be present.

TABLE II

DIVERGENCES IN INTELLIGENCE QUOTIENT

| | Median Class | | | Lowest I. Q. Class | | | Highest I. Q. Class | | | Range Class | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C | A | B | C |
| Stanford Revision.... | 130 | 119 | 116 | 95 | 86 | 94 | 156 | 143 | 137 | 61 | 57 | 43 |
| Composite.... | 127 | 121 | 117 | 102 | 86 | 94 | 147 | 139 | 130 | 45 | 53 | 36 |

Table III presents for chronological age[9] data of the same type as already presented for mental age and intelligence quotient. The differences indicated here are seen to be less than those found for mental age, and are naturally of less significance for the teacher. The overlapping is total for classes B and C, but less marked in the case of class A—a natural resultant from the custom explained in the earlier part of this article of placing in this class the younger children entering from the kindergarten of Teachers College. Although in general Class A has the youngest children, all three groups contain one or more children under six years of age, and one or more over seven years of age. The range in two out of the three groups is two years, and in the third, two years, one month.

TABLE III

DIVERGENCES IN CHRONOLOGICAL AGE

| Median Class | | | Lowest Chronological Age Class | | | Highest Chronological Age Class | | | Range Class | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | A | B | C | A | B | C | A | B | C |
| 6-0.5 | 6-8 | 6-11 | 5-2 | 5-9 | 5-9 | 7-3 | 7-9 | 7-9 | 2-1 | 2-0 | 2-0 |

[9]Calculated to January 1st, as explained in Part II.

In Table IV is presented a distribution of the individual children by classes in mental age and intelligence quotient: the mental age employed is the composite, and the intelligence quotient, that derived from this mental age. The two dotted lines which divide the distribution into four parts indicate, respectively, the steps in which the median of the mental ages and that of the intelligence quotients lie.

TABLE IV

DISTRIBUTION OF MENTAL AGES DERIVED FROM COMPOSITE OF MEASURES, AND INTELLIGENCE QUOTIENTS CORRESPONDING

| I. Q. | 80-89 | | | 90-99 | | | 100-109 | | | 110-119 | | | 120-129 | | | 130-139 | | | 140-149 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C |
| Mental Age | | | | | | | | | | | | | : | | | | | | | | |
| 6-0 to 6-5 | | | | | | | 1 | 1 | | 1 | | | : | | | | | | | | |
| 6-6 to 6-11 | | 1 | | | | 2 | 1 | | | 1 | | 1 | 1 | | | | | | | | |
| 7-0 to 7-5 | | | | | | 1 | 1 | 3 | 3 | 1 | 2 | 1 | 4 | | | | | | | | |
| 7-6 to 7-11 | ... | ... | ... | ... | ... | ... | ... | .1. | .1. | .1. | ... | ... | .1. | .5. | .1. | .4. | .1. | ... | .1. | ... | ... |
| 8-0 to 8-5 | | | | | | | | | | | 2 | 2 | : | 4 | 2 | 1 | 1 | | | | |
| 8-6 to 8-11 | | | | | | | | | | | | 1 | : | 3 | 2 | | 1 | 1 | 2 | | |
| 9-0 to 9-5 | | | | | | | | | | | | | : | 1 | 1 | | 1 | | | | |
| | | | | | | | | | | | | | : | | | | | | | | |

The Table indicates in detail the amount of variation and overlapping. An inspection of the grouping which results from the drawing of the two dotted lines reveals the fact that children from all three classes are represented in each of the following groups: (1) those below the median both in mental age and in intelligence quotient; (2) those in the median steps both in mental age and in intelligence quotient; and (3) those above the median both in mental age and in intelligence quotient. It is thus apparent that the procedure followed in the assignment of pupils to a given class has almost totally failed to take advantage of the opportunity afforded by three first grade groups in the school, for adaptation to individual differences in mental maturity and intelligence.

Naturally, we should expect to find approximately an equal number of children in each of the four divisions of the table indicated by the dotted lines; that is, about an equal number in the low mental age—low intelligence group, in the low mental age—high intelli-

gence group, in the high mental age—low intelligence group, and in the high mental age—high intelligence group. As a matter of fact, however, only two of these groups are clearly defined, namely, the low mental age—low intelligence group, and the high mental age—high intelligence group. Except for the five children falling in the high mental age—low intelligence group, all the children who may be presumed to belong in these two divisions fall in the steps in which the medians lie.

This at once raises the question as to whether some selective factor has not been operating to determine the distribution. In fact, it is highly probable that the other children whom we should have expected to find in the high mental age—low intelligence group, are already in the second grade. On account of their greater chronological age, they have entered school a year earlier, and have thus already been promoted more or less automatically; whereas the children of the same mental age, younger in chronological age, but of greater ability, although fully as able mentally to do the work of the second grade, still remain in the first. Conversely, the other children, whom we should have expected to find in the low mental age—high intelligence group, since they would be under six years of age chronologically,[10] have not as yet entered school, although as able mentally to do the work of the first grade as the older, less able children already admitted. The distribution in Table IV thus affords evidence of the tendency to promote according to age rather than according to ability, and demonstrates the practical consequences of making chronological age so largely the basis of admission to school.

### *A Plan of Reclassification Utilizing the Data Secured*

The answer to the question as to the best use to be made of the data gathered in the survey for purposes of reclassification is probably to be found in the facts presented in Table IV. Lines drawn at the end of the step 7-6 to 7-11 for mental age, and at the beginning of the step 120-129 for intelligence quotient, would suggest boundaries of three first grades, which would include children of relatively equal mental maturity and ability. It is thus possible to

[10]That is, under six years of age on January 1, the date to which the chronological ages of all the children were reckoned, as previously explained.

organize three groups fairly homogeneous from the standpoint of the data collected. In the actual carrying out of any program of reclassification, however, some adjustments would undoubtedly be necessary. Moreover, additional factors which have not been quantitatively measured in this survey, except in so far as they may to some extent have influenced the judgments of the teachers, should be taken into consideration in determining the placing of problematical cases. Among these factors may be mentioned chronological age, physiological development, health, nervous stability, and ability to make social adjustments.

### *Practical Consequences of the Survey*

The complete returns of the survey were available for use at the close of the first semester. But on account of certain administrative difficulties, and the reluctance of the teachers to give up pupils whom they had come to know and understand, a reclassification on this basis was not attempted. Nevertheless, two consequences of considerable practical importance resulted: (1) the increased knowledge on the part of the teachers as to the nature and extent of the differences existing among their own pupils, and a correspondingly greater sympathy and insight into their individual needs; (2) the convincing demonstration of the necessity for gathering similar data for the children throughout the elementary school, looking toward a more scientific method of classification and promotion in the spring.

It is outside the limits of this article to give in detail the methods or the results of the survey of the entire elementary school carried on in the spring. A brief statement only must suffice. In the first place, the available records in psychological tests were assembled for all the pupils in the elementary school, including the children in the kindergarten who were to enter the first grade in the fall, and the chronological ages of the children for February 1st of the following year ascertained. These records were then utilized in computing the mental ages for that date.[11] In addition, teachers' rankings of the pupils as to their fitness for promotion were secured, and standard pedagogical tests in reading and arithmetic given to the children in grades III to VI, inclusive. Subsequently, the teachers'

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[11]The mental ages were computed to the mid-point of the following year, as described above, in order to make possible the formation of groups that would be more nearly homogeneous throughout the year for which the classifications were being made.

rankings were converted into mental ages[12] and the scores in the pedagogical tests into educational ages. After appropriate weightings had been assigned, these various measures were converted into a composite score for each pupil. This single figure then served as a comparative measure to be used as a basis for determining promotions.

The influence of this survey upon the constituency of the first grade groups for the following year will be of particular interest. The records of the kindergarten children were utilized in a tentative classification of first two grade classes differing noticeably in maturity and ability, to the third class being assigned the new children entering from outside the school. This method made possible any necessary adjustments as soon as the evidence from the testing of the new children entering in the fall and the judgments of the three first grade teachers could be taken into consideration in determining the permanent classification of the children for the year.

[12]According to the third method described in Part II.

# RESULTS OF THE COMBINED MENTAL-EDUCATIONAL SURVEY TESTS

RUDOLPH PINTNER and HELEN MARSHALL,
Ohio State University.

In a previous article we have described the construction of the mental and educational survey tests and the significance of the ratings which can be derived from these tests.[1] In this article we give the results obtained by the use of these tests during the last two or three years and shall try to explain their value to the teacher and superintendent in helping to solve the practical problems of classification in the school.

Let us remind the reader that our index ratings run from 0 to 100, that 50 per cent. of the distribution lies between the index numbers 40-59, the upper and lower 23 per cent. between indices 60-79 and 20-39, respectively, the top 2 per cent. between 80-100 and the bottom 2 per cent. between 0-19. These index values are obtained readily from our tables given in the Manual of Directions.[2] The teacher has no computing to do after scoring the tests. After obtaining the total score, she looks in the proper column of the table and finds the index, and the index so found really interprets itself. Three valuable indices are obtained—(1) The Mental Index, showing the child's mental standing; (2) The Educational Index (age), showing the child's educational standing in comparison with other children of the same age; (3) The Educational Index (grade), showing the child's educational standing in comparison with other children of the same grade. The significance and value of these indices will become apparent from a discussion of some typical results in the 56 schools tested.

*The Class Chart.*

Figure I is a typical class chart, taken from the fourth grade of one of the schools. The chart is divided into five horizontal columns, which contain the five groupings of children according to the mental index: 0-19, Dull; 20-39, Backward; 40-59, Normal; 60-79, Bright;

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[1]Pintner, R. and Marshall, H. *A Combined Mental-educational Survey.* J. of Ed. Psych. Vol. XII, No. 1. January, 1921, pp. 32-43.
[2]Manual and Test blanks can be obtained from the College Book Store, Columbus, Ohio.

80-100, Very Bright. In the same way the chart is divided into five vertical columns, which contain the divisions according to educational index by age: 0-19, Very Poor; 20-39, Poor; 40-59, Average; 60-79, Good; 80-100, Very Good. The dots scattered on the chart represent the individual children in the class. Thus, for example, a child may have a mental index of 61 and an educational index of 51, and a dot is therefore placed at the intersection of these two lines. Interpreting this, we could say that the child is mentally bright, but is doing only average work educationally. In the same

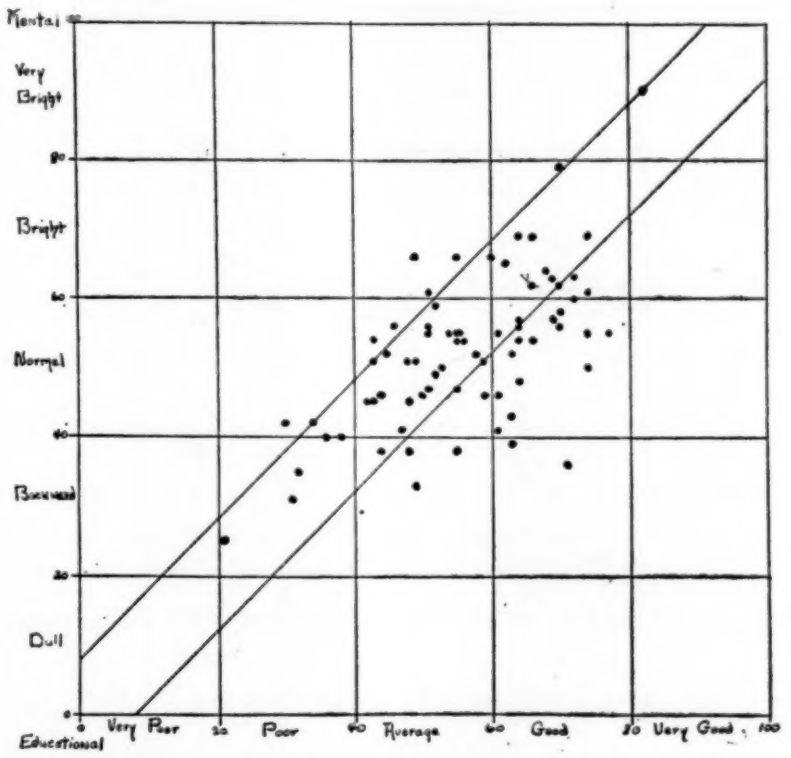


Figure I. Class chart showing mental and educational indices.

way a child whose mental index is 35 and whose educational index is 32 is backward mentally and is doing poor educational work for his age. In another case we find a child with a mental index of 39 and an educational index of 63. This child, although slightly backward, has succeeded in doing good educational work.

The diagonal lines on the charts enclose those cases whose index differences lie between minus 8 and plus 8, and, as explained in our previous article, include the middle 50 per cent. of the total distribution.[3] These children may be considered as doing approximately

[3]Pintner, R. and Marshall, H. op, cit.

work which would be indicated by their mental ability. The upper triangle to the left includes those cases whose index differences are greater than minus 8. This means that all the cases in this triangle are doing less school work than their mentality seems to warrant. In this particular class there are seven cases lying in the upper triangle; that is, there are seven children who are doing decidedly poorer work educationally than they should be doing considering their mental ability. They represent wasted intelligence in the school. Cases of this sort should be scrutinized carefully by the

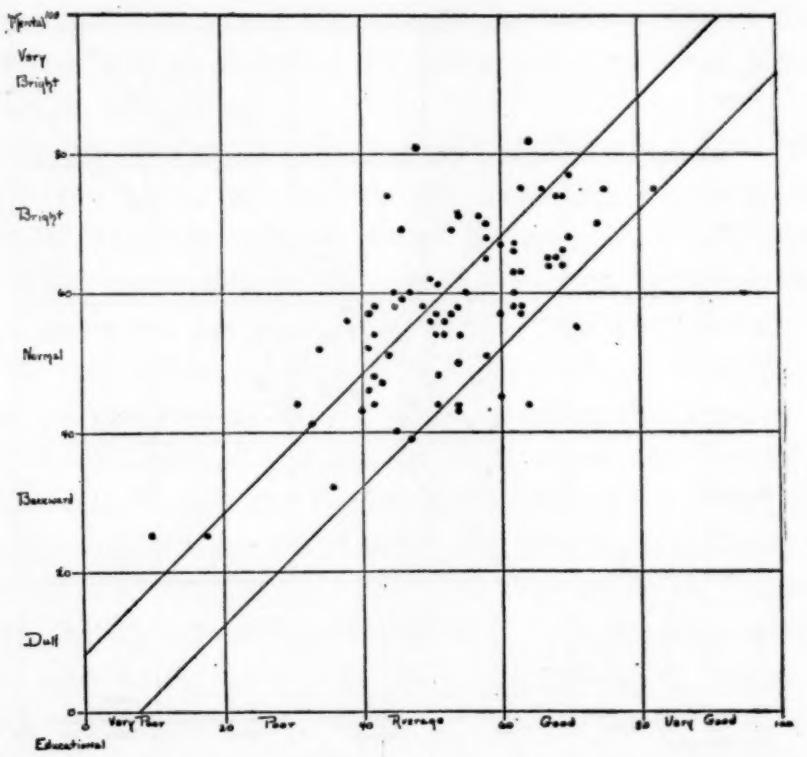


Figure II. Class chart showing mental and educational indices.

teacher from the standpoint of getting more out of those particular children than they are at present accomplishing. The corresponding lower triangle to the right includes those cases whose index differences are above plus 8. This indicates that all the cases in this triangle are accomplishing more than the average child of their mentality, this being probably due to good teaching, a good school, a good home, regular attendance, placement in proper grade, and the like. In this particular class we note there are 22 such cases and, comparing this number with the seven cases in the upper triangle, we should conclude that the class as a whole is accomplishing edu-

cationally more than is usually accomplished with children of their mentality.

In spite of the general good showing of the class under discussion, there are other possible suggestions that we may draw from the chart. In the four upper right-hand squares of the chart we note that there are 12 children who are all above 60 both mentally and educationally. They are all bright or better mentally and are all doing good or better educational work for their age. If this educational work is also rated as good educational work for the grade they are in, they should certainly be considered for immediate promotion. As we shall see later, we must take into consideration their

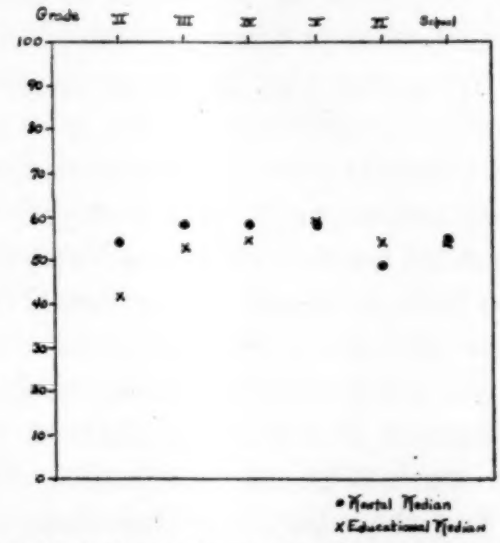


Figure III. School chart showing median indices for each grade.

educational indices according to grade and in accordance with these indices recommend an extra promotion.

Figure II shows another class chart. This time we note a large number of cases in the upper left-hand triangle. There is a much greater waste of intelligence in this class than in the previous one. Although the class as a whole shows a large majority of its pupils possessing normal mentality or above, nevertheless their educational attainment is not commensurate with their mental ability. The whole class lags behind what it should accomplish, and there are some striking individual examples of waste. At the top of the chart we note two children classed as very bright by the mental tests. One of these is only accomplishing average educational work and the other good educational work. Both of these should be in do-

ing very good educational work. Obviously there is great need for investigation here. And the same is true of many bright and many normal children. Is the teaching of this class poor, or are the standards set by the teacher or school too low? Something evidently is wrong and our tests have brought it to light very distinctly.

*School Chart.*

Figure III summarizes the work of an entire school. Thus the median mental index for the second grade is 54 and the educational median is 42; that is, the class as a whole is slightly above the average in mentality, but is doing poorer educational work than is to be expected. An index difference of minus 12 is undesirable, and the grade needs special attention in order to bring its educational work up to standard. In this particular instance the discrepancy is probably due to the crowded conditions in the school. The class was seated in a basement room, with inadequate lighting. Moreover, the children attended school only half a day. Grade IV, on the other hand, has a mental median of 58 and an educational median of 55. The difference here of minus 3 is so small as to be negligible, and both medians are well above average.

The chart also shows the medians for the whole school. As is to be expected, the difference is less than that of any specific class, since it combines the work of so many classes. The mental median for the school is 55, and the educational median is 54. That means that the school is somewhat above the average both mentally and educationally, and the difference of minus 1 is negligible.

The significance of a chart of this kind will be obvious to any principal. It shows immediately the grades which need more attention and investigation, both as to quality of teaching and proper classification of pupils. Wherever the educational index is below the mental to the extent of 3 or 4 points, there is obvious need for further investigation. In this particular school grades II and III are not properly adjusted. There is too large a discrepancy between their mental and educational indices.

*Comparison of Schools.*

It has been the practice in the past to rate schools primarily on the basis of gross accomplishment. It is undoubtedly desirable to know that the pupils in a given school are accomplishing so much

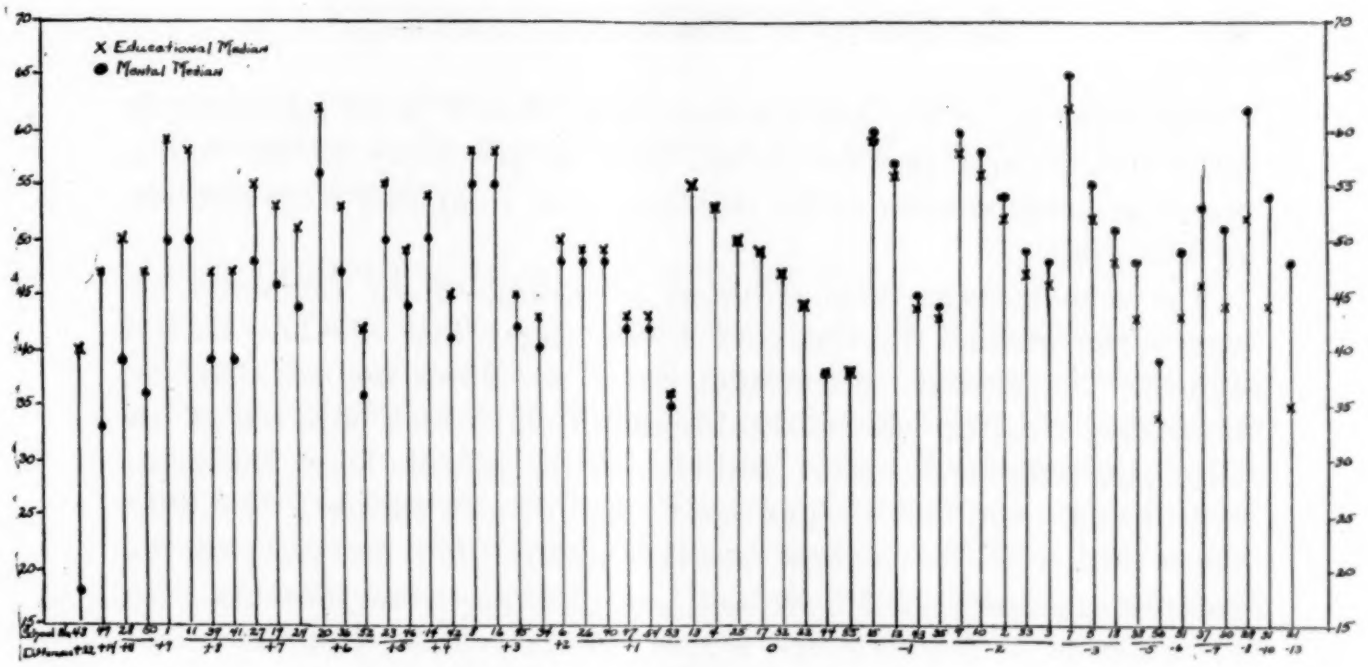


Figure IV. Comparison of schools.

more or less than the pupils in another school. And, all other things being equal, this would be a perfectly satisfactory method of evaluating schools. Such a method, however, neglects one very important factor in the equation, namely, the pupil-material with which various schools have to deal. School A may be doing exactly the same grade of work, educationally, as School B. Does that mean that the two schools deserve equal credit? School A is a small rural school, with an apparently selected group of children, whose median mental index is 60. School B is a larger school, whose three teachers must divide the work of handling eight grades. Moreover, the median mental index for School B is only 51. Instead of commending School A for its educational work, we will come to expect even better work from it, work commensurate with its pupil-material.

In preparing Figure IV, the schools were first ranked on the basis of gross educational accomplishment. Thus—

| Schools numbered. | Median educational indices (grade). |
|---|---|
| 1- 4 | 60 and above |
| 5-14 | 55 to 59 |
| 15-23 | 50 to 54 |
| 24-39 | 45 to 49 |
| 40-48 | 40 to 44 |
| 49-56 | 35 to 39 |

The numbers of the schools rank them from 1 to 56 according to their educational (grade) index; that is, according to the educational accomplishment of the children when compared with children of like grade.

The schools were then arranged according to the difference between the Median Educational Index (age) and Median Mental Index. The median educational index as shown on the chart is, therefore, a rating which compares each child with children of his own age, whereas the rank numbers of the schools show the gross educational attainment regardless of age. As in rating individuals, the school with the highest positive index difference receives the greatest amount of credit, without regard to any other measure. An examination of the table and a study of the relative position of the schools in comparison with their absolute rank will yield some interesting information. For example, school No. 1, which ranks first educationally, is also a good school on this basis, since it has an index difference of plus 9. On the other hand, school No. 52, which ranks low on the basis of absolute gross accomplishment, nevertheless shows a difference of plus 6, and deserves credit for having accomplished so much more than its median mental index would promise. School No. 48 is an interesting case. This is a small rural school, with one family of low mentality contributing nearly half of the pupils. As a result, the median mental index for the school is only 18 (Dull). In spite of this evident handicap, the teacher has succeeded in raising the educational index median to 40.

In contrast to these schools, Nos. 2 and 3 are good examples of schools which, while doing very acceptable work educationally, yet fall short of the type of accomplishment which could be demanded of the pupil-material. It is safe to assert that with increased effort on the part of teacher and pupils, with improved home or school conditions, these schools could raise their median educational indices.

Again the chart is valuable in showing the great differences in mental ability and in educational attainment in different schools. Looking at the dots on the chart we note how great the difference in mental ability is. Schools No. 7 and 29 have the highest median mental indices, yet both of these schools are failing to take adequate advantage of the mental ability of their pupils. There are many schools with higher educational indices than No. 29 which do not

possess as good mental material. This type of chart can be strongly recommended to the school superintendent for a study of the schools under his direction.

*Practical Problems to Be Solved by the Tests.*

On the basis of the results of these tests, it is possible to make definite recommendations to schools for the purpose of increasing educational efficiency. Children whose index difference is minus 9 or greater are obviously not working up to their mental ability. Many bright children will be found in this group, as can be seen from a study of the upper left-hand triangles of Figures II and III. The percentage of children in this group represents the amount of waste in the school. It would be necessary then to investigate each case thoroughly and make every effort to remove the cause of lowered working power. The causes probably operating in such conditions are:

(1) Misplacement in grade. The child may be too far advanced, and therefore baffled by the amount of strange material presented to him. Or, as is more common, he may not be far enough advanced, in which case he will find the work too easy and develop habits of laziness which it will later be difficult to destroy.
(2) Lack of interest, laziness and similar emotional and temperamental factors.
(3) Bad physical conditions.
(4) Bad of undesirable home conditions.
(5) Crowded conditions in the school.
(6) Poor teaching, which fails to arouse the best that is in the child; dislike of the teacher.

While all of these conditions are such that they may be bettered by the school, it is the problem of grade misplacement which comes most definitely within the scope of these tests. In the case of children whose educational (grade) index is 70 or above, if at the same time the mental index is 70 or above, immediate promotion is desirable. Such children are simply forming habits of indolence if they remain in their present grade, and are fully capable of handling the work of the next grade, since in every case an index of 70 in one grade indicates a score equivalent to an index of 50 or more in the next higher grade. Therefore, promote immediately to the next

grade all children with both educational (grade) and mental indices of 70 and above.

In addition to this immediate promotion, those children having educational (grade) indices between 60 and 69 and mental indices of 60 to 69 should be coached for an extra (or double) promotion the following semester. They will undoubtedly be capable of doing the work, since an index of 60 in one grade is equivalent to an index of 40 or above in the grade next higher.

In addition to coaching these children for prospective promotion, every child with an index difference of minus 9 or below, not included in the two preceding groups, should receive special attention from the coaching teacher, not with reference to promotion, but merely to make them accomplish work worthy of their mental ability. These children will range all the way from Very Bright to Very Dull mentally. In determining the special subjects in which these children are deficient, it will be profitable to supplement the teacher's judgment by reference to the various divisions of the Educational Test. It must be kept in mind that reading ability is fundamentally necessary in all parts of this test.

A special class of bright children should be formed when there are a number of such children in about the same grade. This class would probably include all children with mental indices of 60 or above, whose educational (grade) index does not fall below 50. If such a group is kept as a separate unit, it can be advanced through the school system at a more rapid rate and with profit to them, since they will not be held back by the slower members of the class. On the other hand, the children left in the original class will not be competing with the high standards of this group, and will be able to accomplish better work as a result of the separation.

In the same way a slow-moving unit of dull children should be formed wherever conditions demand it. Children with a mental index of 39 or below are seldom able to keep up the regular pace of school work. It is this group which furnishes the bulk of our retarded children, who subsequently become dissatisfied with school and prove disturbing elements both in school and outside. If we recognize frankly that these children should be allowed to move more slowly, we will go far to better conditions and increase their happiness. Wherever it is possible considerable handwork should be taught in these slow-moving classes. Often a backward or dull child

can be interested in the more academic subject by means of a judicious mixture of motor activities.

*Conclusions.*

Mental or educational tests alone are not adequate for a thoroughgoing survey of a school or school system. Such tests show wide differences in the educational attainment and in the mental ability of the pupil-material. A real diagnosis of the difficulties existing in any particular instance can only be arrived at by a combined mental-educational survey. The evaluation of the educational findings in the light of the mental findings is the only adequate and scientific method of procedure. Such an evaluation will show where the real discrepancies exist. We shall find waste in pupils of all degrees of ability and, indeed, more often in those of superior ability. We shall find that many schools whose educational level seems passable or good are really inefficient and wasteful of the splendid pupil-material they possess. Combined mental-educational surveys will help to correct these deficiencies and to lay the emphasis where it really belongs.

# MASSED VS. DISTRIBUTED EFFORT IN LEARNING*

L. A. PECHSTEIN,
University of Rochester.

Ebbinghaus, Yost, Browning, Brown and Washburn, Murphy, Ulrich, Pechstein, Lashley, Carr and Cummins have contributed experimentally to the question whether it is more efficient to learn a problem with the learning effort being massed, i. e., continuous in time, or broken by periods of changed activity. Everyone contributing to the discussion agrees, in general, that distributed practice is more efficient than massed, the tendency being to generalize for various types of learning material, such as motor, nonsensical and meaningful. Specialized discussions by Carr (1) and Cummins (2) raise the question whether the efficiency of distributed effort is confined to certain stages in the learning process or whether this mode of acquisition is uniformly effective for all stages in the development of a habit, they answering that distributed effort is of greater efficiency during the early stages. Lashley, Colvin and all educational psychologists comment upon the neurological aspects of distributed learning, although Lashley (3) seems to take exception to the doctrine of a gradual "setting" of the nervous connections between practice periods.

The purpose of this paper is to show that the entire question is tied up with a second, namely,—is the learning material mastered as a whole or in parts?

The experimentation is restricted to the field of motor learning, the learning problem being a very difficult maze reported three years ago (4). This maze subdivides into four sections highly comparable in basic features and difficulty, these being so arranged that the maze can be learned as a whole, in parts, or in any combination of parts. The learning criteria are the number of trials required to secure four out of five perfect runs, learning time and learning errors, the latter being those conventionally recorded in maze experimentation. The experimental technique is exactly the same as reported in earlier articles.

Earlier experimentation with this particular maze naturally had shown that human adults learned the problem far more economically

*Read at the annual meeting of the American Psychological Association, December 28-30, 1920.

when their effort was distributed at the rate of one trial per day rather than massed (5). In fact, the maze had proved too difficult for certain human subjects to learn under massed conditions. Also, it was shown to be more economical for these adults to learn their problem as a whole rather than to learn the four units separately, finally connecting them in serial order, provided the learning effort was distributed in each case. Because of the difficulty of the maze and the way in which the rat is organized, it was naturally impossible to secure massed learning results from the rats. The initial step of the present experiment was to shorten the maze problem, hereby to discover whether rats could be taught a simple problem under massed requirements; subsequently, to study human learning under comparable conditions.

Because the particular maze used in my whole-part experimentation is made up of four short and separate maze units, these simple units were employed to test the capacity of the rat to learn under massed conditions. After being handled and fed in the food box for a standardized period of 10 days, feeding was skipped for 48 hours, whereupon the training was begun. Each rat learned the first short maze section with apparent ease, although the amount of learning effort expended far surpassed what I had supposed the white rat capable of continuously directing. A short feeding was allowed after all in the group had mastered the first section. On the following day Section II was learned with ease under massed conditions, this being followed by the mastery of Sections III and IV upon the third and fourth day, respectively.

Upon the day following the learning of the last section, each rat was set the problem of connecting the units into proper serial order. Not only did each member of the group effect the perfect connections under massed conditions, but several made the complex step without securing a single error. Herein is the most striking feature of the entire situation. When humans or rats are taught these short units under distributed conditions, the complex act of connection proves extremely difficult. *When these units are learned under massed conditions, not only is this first learning task easy, but the hard act of connection becomes extremely simple.*

Comparable results held when human adults were tested under like temporal conditions.

An inspection of Table I points the way to several significant conclusions:

TABLE I.—A table to show the mean number of trials, time and errors of two groups of rats (nine per group) and two groups of humans (six per group) in learning Maze A by the "part" method. The records for distributed learning appear first in each section, the massed learning records second. The third item in the **total** is for groups learning the Maze as a whole under distributed conditions, the last as a whole under massed conditions. For estimating total runs, each sectional run is counted as one-fourth the entire (I-IV) run.

| | Rats. | | | Humans. | | |
|---|---|---|---|---|---|---|
| Section. | Trials. | Time. | Errors. | Trials. | Time. | Errors. |
| I ..... | 34 | 470″ | 52 | 6 | 198″ | 24 |
| | 11 | 256″ | 27 | 5 | 93″ | 12 |
| II ..... | 2 | 33″ | 3 | 3 | 47″ | 10 |
| | 5 | 51″ | 6 | 1 | 45″ | 9 |
| III ..... | 14 | 127″ | 14 | 2 | 49″ | 5 |
| | 7 | 72″ | 12 | 2 | 28″ | 4 |
| IV ..... | 9 | 111″ | 11 | 1 | 25″ | 7 |
| | 1 | 11″ | 2 | 2 | 28″ | 5 |
| I-IV ..... | 15 | 1166″ | 119 | 20 | 901″ | 191 |
| | 4 | 439″ | 88 | 8 | 344″ | 78 |
| | 30 | 1907″ | 199 | 23 | 1220″ | 237 |
| | 10 | 829″ | 135 | 10 | 538″ | 108 |
| | 27 | 4174″ | 217 | 12 | 641″ | 126 |
| Total..... | .. | ..... | ... | 30 | 1250″ | 260 |

First, provided the maze problem is short, it is more economical to mass learning effort than to distribute it, irrespective whether economy is estimated in terms of trials, time or errors.

Second, for subsequently learned short runs (allowing transfer possibilities), massed effort continues, in general, to be preferable, it hereby appearing that, if problems are thoroughly learned before subsequent ones are undertaken, the transfer is positive rather than negative.

Third, in connecting short maze patterns learned as separate units, the complex act of connection is not only possible in a massed program, but is accomplished with very great economy, just so long as the units have been learned as massed effort problems.

Fourth, the longer and more difficult the problem, the more advisable to break it up into units and learn both the units and the connection of these under massed conditions, it being uneconomical to learn the hard problem as a whole, irrespective whether effort is massed or distributed.

Fifth, it is clear that the question of massed vs. distributed learning is tied up with the question whether the difficult problem is to be learned as a whole or in parts. The hard problem becomes easy if it is learned under massed conditions by the part method and in no other way; it remains hard if it is learned as a whole under massed or distributed conditions, or even in parts under distributed conditions.

Sixth, these results hold for motor learning of the maze type, both for selected animals and the human adult.

The explanation of the conclusions is not far to seek. It is not necessary to comment upon the advantages inherent in any part method, such as the full utilization of transfer possibilities, the diminishing returns secured as the problem is lengthened, etc., since these are, presumably, fairly constant under both massed and distributed learning. It is essential to show why an easy problem is best learned under massed conditions and why several so learned can readily be united through massed effort. Explanation rests here, I believe, upon two principles operative in all learning.

The first of these is the principle of *elimination*. "It connotes the detection of critical points in the problem, the careful study of all the details, the formation of proper associations, the rejection of others, etc. Consciousness is here at white-heat. The longer and more difficult the problem, the greater the task upon the learner to see the many details of the problem and to learn to eliminate the possible faulty reactions. Confusion, hesitation, emotional conditions all operate to delay the learning" (6). If the problem is short and easy, the principle of elimination operates with maximum effectiveness. No emotional complex is aroused to disturb the organism in utilizing all his problem-solving, adjustmental powers; the relative fewness of possible errors makes these lie within the organism's powers of mastery; the learner has available the energy required for the successive explorative trials, and this is utilized; if given one trial only, the learner is far within the limit of his available strength. Massed effort upon a long and hard problem strains the power of the organism and elimination ceases to operate efficiently; massed effort upon an easy problem challenges the organism to work within normal and proper limits, and elimination operates efficiently; distributed effort upon an easy problem allows the eliminative principle to operate, but does not secure that total

learning efficiency normally expected after the preliminary warming-up stage; distributed effort upon the hard problem gives opportunity for the eliminative principle to operate, but not always at its best, since the difficulty of the problem generally strains the organism beyond the normal limits of its power.

The second learning principle involved is that of *mechanization.* "This final stage of learning is no longer explorative and eliminative, but rather, mechanizing and rendering habitual the entire activity. Whole method learning presents so many critical details that the principle of mechanization is not only delayed in being given an opportunity to operate, but is repeatedly nullified by the re-injection of the highly conscious eliminative principle" (6). This condition maintains both for massed or distributed attack upon the hard problem. The part method utilizes the two methods to best advantage. The explorative or eliminative principle is operative when the details of the short and easy parts are being grasped, it being made clear that the best elimination is secured by massing the learning of each short part. Then the time becomes ripe, logically and psychologically, for the mechanizing principle to operate. It secures the mechanization of each unit and their connection, herein being concerned only with rapidly welding the several unit habits. Psychologically speaking, the runner who hesitates in this stage is lost. By rapid and consecutive runs he forced the required union. Fortunately, if he has learned the units as massed problems, his act of connection is very easy, while it is extremely difficult if the unit habits are set up under distributed conditions. Why? Because in working steadily through a massed period upon short problems he has come to set up habits of long application, exactly what is required for the complex act of connection. The distributing learner, only having one trial per day upon short units, has acquired habits of short application, these almost rendering impossible the final connection and mechanization of the units into a perfect total habit.

The whole method never secures complete utilization of the principles of elimination and mechanization, the loss being greater for massed learning. The part method secures full utilization of the principles, provided the learner masses his effort.

Part method and massed learning—so long anathema to the pure and educational psychologist—may not be understood one apart

from the other; employed together, they make the best arrangement for learning difficult motor problems.

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# AN EXPERIMENTAL STUDY OF THE VALUE OF WORD STUDY

V. A. C. HENMON,
University of Wisconsin.

During the first semester of 1919-20 there was conducted in the Madison High School, with a part of the sophomore class, an experiment in word study as a substitute for the regular work in English composition and literature. A group of 54 pupils, designated in this paper as the word study group, did intensive work in word study and analysis under the direction of Miss Leslie Spence. The work was based on a syllabus prepared by Miss Spence, and was carried on for approximately 12 weeks of the semester. The remainder of the semester was given to literature and composition.

Mr. Volney G. Barnes, principal of the school, while confident from personal observation and judgment that the course was valuable, raised the question with the writer as to whether it was not possible to apply tests which would demonstrate objectively the values that might have accrued from the course and prove or disprove the correctness of his opinion as to the desirability of its continuance. This was in the nature of a challenge to experimental education and was gladly accepted. The following study, made with the assistance of Miss Jane H. Butt, is the result.

The problem presented was to determine as accurately and definitely as possible the specific outcomes which such a word study course might be expected to realize, and then to select or construct tests which would measure these outcomes as adequately as possible. Moreover, for comparison, a group of pupils must be selected of equal ability in general scholarship and with equal amounts of foreign language who have had the regular work in composition and literature. The tests should, if possible, be of such a nature that they could fairly be given to this non-word study group also.

What, then, are the specific outcomes that might be expected of an intensive word study course? We may expect it to function in at least four specific ways:

First—In increase in vocabulary.

Second—In increase in ability to give meanings accurately.

Third—In increase in ability to choose words discriminately.

Fourth—In increase in ability to read difficult prose understandingly.

These would doubtless be accepted as the major outcomes of the course whatever other values might be claimed.

The tests employed to measure them were:

1. Terman's Vocabulary Test, 100 words, given as a group test with these instructions: "Show that you know what each word means either by giving a definition of it, a synonym of it, or by using it in a sentence in such a way as to show that you know its meaning."
2. Thorndike's Visual Vocabulary, scored both according to Thorndike's method and the total number right.
3. A special test of 25 words selected from a list of 100 words where a knowledge of roots, prefixes and suffixes would have an opportunity to function, but which should also be words with which pupils of sophomore high school grade might reasonably be expected to have come in contact.
4. Trabue's Completion Scale L, used to test ability to discriminate in the choice of words.
5. Tests 1a and 1b of the Thorndike Intelligence Examination, Part III, used to measure ability to read rather difficult prose understandingly.

These tests were given to all members of the sophomore class, approximately 350. Each pupil of the word study group was paired with another of equal scholarship based on freshman marks and marks of the first semester of the sophomore year and of equal amount of language work in Latin or French. There are, then, two groups, the Word Study and the Non-word Study, approximately equal in general scholarship and in school marks in English, Latin and French.

Table I gives the essential facts for comparing the groups both in scholarship and in the tests. Whatever advantage there may be in the two groups in scholarship, except in Latin, is in favor of the non-word study group as indicated by the differences in averages. There were, however, only six pupils in each group who had had Latin. It will be noted that the differences in scholarship are all well within the probable error of the difference except in the case of the English marks, which definitely are in favor of the non-word study group.

TABLE I.

SCHOLARSHIP GRADES.

| | Scholarship. | | | English. | | | French. | | | Latin. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ave. Grade. | M. V. | P. E. | Ave Grade. | M. V. | P. E. | Ave. Grade. | M. V. | P. E. | Ave. Grade. | M. V. | P. E. |
| Word Study Group..... | 76.8 | 7.6 | .87 | 74.8 | 6.9 | .79 | 73.2 | 6.8 | 1.5 | 86.5 | 4.6 | 1.6 |
| Non Word Study Group..... | 77.2 | 7.4 | .85 | 76.7 | 6.8 | .78 | 78.7 | 8.7 | 1.9 | 83.5 | 11.6 | 4.0 |
| Difference..... | — .4 | ... | ... | — 1.9 | ... | ... | — 5.5 | ... | ... | + 3.0 | .... | ... |
| P. E. of Difference..... | .... | ... | 1.2 | .... | ... | 1.1 | .... | ... | 2.5 | .... | .... | 4.2 |

TESTS.

| Thorndike 1 A | | | Thorndike 1 B | | | Trabue Sc. L | | | Word Meaning No. | | | Terman Vocabulary No. | | | Thorndike Visual Vocabulary | | | Thorndike Visual Vocabulary No. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Score | M.V. | P.E. | Score | M.V. | P.E. | Score | M.V. | P.E. | right | M.V. | P.E. | right | M.V. | P.E. | Score | M.V. | P.E. | right | M.V. | P.E. |
| 6.4 | 3.8 | .43 | 5.3 | 3.5 | .40 | 8.7 | 1.8 | .21 | 16.3 | 2.7 | .31 | 58.2 | 8.3 | .98 | 8.4 | .8 | .09 | 77.2 | 10.4 | 1.44 |
| 5.3 | 4.0 | .60 | 3.1 | 3.3 | .32 | 7.5 | 2.2 | .25 | 12.7 | 2.3 | .26 | 53.0 | 8.1 | .93 | 8.0 | .8 | .09 | 71.9 | 11.8 | 1.69 |
| +1.1 | ... | ... | +2.2 | ... | ... | 1.2 | ... | ... | + 3.6 | ... | ... | + 5.2 | ... | .... | + .4 | .. | ... | + 5.3 | .... | .... |
| ... | ... | .73 | ... | ... | .51 | ... | ... | .32 | .... | ... | .40 | .... | ... | 1.35 | ... | .. | .3 | .... | .... | 1.7 |

The results in the tests show in each case a positive difference in favor of the word study group. That the differences, while small, are significant is indicated by the fact that they are in all cases larger than the probable error of the difference, four times the probable error or more in four of the tests. In the vocabulary tests, where we might look for the greatest showing, we find the greatest differences. This is particularly true in the word meaning test, as might be expected. The reading and language ability tests, Thorndike 1a and 1b, and Trabue Completion, however, give differences that are substantial and significant unless one sets a standard of difference to be significant higher than four times the probable error.

The specific question proposed at the outset of this investigation was this: "Is a special course in word study for high school sophomores worth while and should it be confined?" The results, if taken at their face value, would indicate an affirmative answer. Before drawing such a conclusion, however, certain questions arise. Was the statement of the outcomes adequate or are there other important outcomes that were overlooked? (1) The course might be claimed to possess disciplinary value quite apart from the specific outcomes enumerated. In the light of present-day educational opinion this would, in any case, be a doubtful basis for the introduction or continuance of such a course. (2) It might serve as an introduction to the study of foreign language or arouse an interest in it. This effect might be shown in elections next year and in progress in foreign language work. (3) It might develop that rather intangible thing called language consciousness. (4) It might function in study habits and, in particular, give training in use of the library. No attempt has been made to evaluate these possible results experimentally.

Are the tests adequate and valid? They do measure very definite outcomes, but they do not, of course, measure what the word study group may have lost in literary appreciation or improvement in composition which may have come from the regular work in literature and composition. It should be borne in mind, however, that the specific outcomes of word study are, at the same time, the major objectives in composition and literature. The enlargement of vocabulary, increase in discriminativeness in the use of words, and ability to read understandingly are surely the major purposes of English study of any sort. While more specific tests might have

been devised for the word study group, the necessity of tests that could be given to the non-word study group fairly led to the selection so far as possible of tests already standardized. While it would have been desirable to give a general intelligence test in order to insure equality in the groups, the four sets of scholarship ratings were deemed sufficient evidence.

Even so, the question proposed is difficult to answer on a basis of these results, or, for that matter, on the basis of any study that might be made. The answer depends upon one's educational philosophy as to the aims and purposes of any sort of education and training. If, however, we grant the major propositions that the enlargement of vocabulary, increased ability to discriminate in the use of words, and finally increased ability to read understandingly are themselves definitely worth while and worth making definite efforts to secure, then the question would be answered in the affirmative. Genuinely significant differences in these abilities have been shown to result from less than a semester of word study.

# GROUP TESTS OF INTELLIGENCE: AN ANNOTATED LIST

J. CARLETON BELL,
Maxwell Training School for Teachers, Brooklyn, N. Y.

Since Alfred Binet published his "Measuring Scale of Intelligence" in 1908 the interest in tests of intelligence has grown apace. For the first few years after the Binet Scale became known in this country attention was directed chiefly to the adaptation and revision of it to fit American conditions. In this period we have the revisions of Goddard, Huey, Wallin, Kuhlmann and (most recent and best known) Terman. As a derivative of these attempts at revision we also have the "Yerkes Point Scale for Measuring Mental Ability." The Binet Scale, however, and all of its revisions demand the individual examination of the child, and to make individual studies of several hundred or several thousand children requires such an expenditure of time and energy as practically to prohibit the incorporation of mental testing into the regular routine of school work.

Out of this situation arose the demand for Group Tests of Intelligence—a demand greatly intensified by our sudden entry into the World War, and by our need of the help of psychology to 'put the right man in the right place.' The wide publicity given to the wholesale testing of our recruits acted as a tremendous stimulus to the development of Group Tests. As a result the past two years have seen the publication of an almost bewildering array of tests, and there is now great need for comparison, analysis and evaluation. In the following the writer has attempted merely to list the tests of which he knows, and to comment briefly on the more important of them. It is likely that the list here compiled is far from complete:

1. Mrs. Sidney L. Pressey. Mental Survey Tests, Primer Scale. Department of Psychology, University of Indiana, Bloomington, Ind. A group of four tests (dot pattern, classification, picture form board and picture absurdities) designed for grades 1-3. The tests involve neither reading nor writing, enlist the active co-operation of the children, and give a correlation of .58 with teachers' estimates.

2. Arthur S. Otis. Otis Group Intelligence Scale; Primary Examination. World Book Company, Yonkers, N. Y. Eight picture tests (directions, substitution, missing parts, maze, sequence, simi-

larities, etc.) for grades 1-4. Issued in two equivalent forms, A and B.

3. M. E. Haggerty. Intelligence Examination. Delta 1. World Book Company, Yonkers, N. Y. Six tests, with a fore-exercise for each one. The tests are directions, copying designs, picture completion, picture comparison, symbol-digit, and word comparison, and are designed for grades 1-3. They were used in the Virginia School Survey, and give a correlation of .68 with teachers' estimates.

4. Kingsbury Primary Group Intelligence Test. Bureau of Educational Research, University of Illinois, Urbana, Ill.

5. Walter F. Dearborn. Group Intelligence Tests for Primary Grades. J. B. Lippincott Company, Philadelphia, Pa. Sub-title, "Games and Picture Puzzles."

6. Frances Lowell. A Group Intelligence Scale for Primary Grades. Journal of Applied Psychology, Vol. III, September, 1919, 215-247. Twenty-five tests arranged in groups of five for each year for the chronological ages 5 to 9, inclusive. The tests are taken largely from Binet, Kuhlmann, and other standard sources, and adapted to use with groups.

7. Caroline E. and Garry C. Myers. The Myers Mental Measure. The Sentinel, Carlisle, Pa. (See School and Society, September 20, 1919, 355-360.) For grades 1-8. An outgrowth of experience with the Army Mental Tests. Requires only 20 minutes to give, and is said to show a correlation of .80 with the Standard Revision of the Binet Scale.

8. Rudolf Pintner. The Mental Survey. New York: D. Appleton & Co., 1918. Pp. 116. Six mental tests, taken chiefly from Whipple, and standardized as group tests on over 3000 school children of chronological ages 6-16. Elaborate tables of percentile norms are given.

9. Grace Arthur and Herbert Woodrow. An Absolute Intelligence Scale. Journal of Applied Psychology, Vol. III, June, 1919, 118-137. A battery of nine tests (memory span, easy opposites, hard opposites, substitution, word building, language completion, anagrams, cancellation, and comprehension) standardized by elaborate statistical treatment to give norms in absolute points for the chronological ages 6.5 to 13.5.

10. Rudolf Pintner. A Non-language Group Intelligence Test. Journal of Applied Psychology, Vol. III, September, 1919, 199-214.

A series of six tests (imitation, easy learning, hard learning, drawing completion, reversed drawings, and picture reconstruction) standardized on the basis of point scores for the chronological ages 7 to 13.

11. Edward L. Thorndike. A Standardized Group Examination of Intelligence Independent of Language. Journal of Applied Psychology, Vol. III, March, 1919, 13-32. Eight tests (digit-symbol, lines dividing surfaces, picture completion, forms completion, picture analogies, spatial relations, memory of objects, and easy computation) derived from the Beta Army Tests, and applied to groups ranging from feeble-minded (mental age 7.5) to superior adults.

12. The Illinois Examination. (See B. R. Buckingham and Walter S. Monroe, A Testing Program for Elementary Schools, Journal of Educational Research, Vol. II, September, 1920, 521-532.) A series of tests including analogies, arithmetical problems, sentence vocabulary, substitution, verbal ingenuity, arithmetical ingenuity, and synonym-antonym, for grades 3 to 8.

13. William Henry Pyle. A Manual for the Mental and Physical Examination of School Children. University of Missouri Bulletin, Vol. 21, No. 12, February, 1920. The mental examination consists of eight tests (logical memory, rote memory, substitution, free association, opposites, word building, completion, and analogues) with norms for the chronological ages 8 to 18.

14. S. L. Pressey and L. W. Pressey. A Group Point Scale for Measuring General Intelligence, with First Results from 1100 School Children. Journal of Applied Psychology, Vol. II, September, 1918, 250-269. The scale contains 10 tests, as follows: Rote memory, logical selection, arithmetic, opposites, logical memory, word completion, moral classification, dissected sentences, practical information, and analogies. There are tables of norms for chronological ages 8 to 17.

15. M. E. Haggerty. Intelligence Examination, Delta 2. World Book Company, Yonkers, N. Y. An adaptation of the Army Intelligence Examinations for school children of grades 3 to 9, for use in the Virginia School Survey. The examination consists of six tests (sentence reading, arithmetical problems, picture completion, synonym-antonym, practical judgment, and information), with age and grade norms in terms of total scores for ages 8 to 15.

16. National Intelligence Tests. Scale A (arithmetical reason-

ing, sentence completion, logical selection, synonym-antonym, and symbol-digit) and Scale B (computation, information, vocabulary, analogies, and comparison). World Book Company, Yonkers, N. Y. These scales are designed for use in grades 3 to 8. They are the outgrowth of the Army Intelligence Tests, and were prepared under the auspices of the National Research Council by a committee of psychologists consisting of M. E. Haggerty, L. M. Terman, E. L. Thorndike, G. M. Whipple and R. M. Yerkes, chairman. The General Education Board appropriated $25,000 for the standardization of these tests, and they are probably the most reliable of any group tests of intelligence. Each scale is furnished in five forms of equivalent difficulty.

17. Paul R. Stevenson. Omaha Group Test of Intelligence. Bureau of Research, University of Omaha. Eight tests, containing from five to fifteen exercises each. They include likeness and difference, corrction of statement, arithmetical problems, disarranged sentences, following directions, synonyms-antonyms, analogies, and range of information. They are intended for grades 3 to 9, and require 20 minutes to give. In the printed directions one or more crucial words are omitted and must be written in at the dictation of the examiner. This is designed to prevent pupils working ahead.

18. Guy M. Whipple. Group Test for Grammar Grades. Public School Publishing Company, Bloomington, Ill. These tests (arithmetic, completion, substitution, reasoning, punched-hole test, and proverbs) have been tentatively standardized for grades 4 to 7, but difficulties of administration make their use somewhat unsatisfactory.

19. Walter F. Dearborn. The Dearborn Group Tests of Intelligence, Series II, General Examinations, 4 and 5, for grades 4 to 9. J. B. Lippincott Company, Philadelphia. The title printed in large type at the top of the first page is "Games and Puzzles." There are ten tests, three of them verbal. They are: Sequence of relations, order of terms, picture form board, completion, direction, pictorial representation of terms, mazes, proverbs, picture absurdities, and computation.

20. Sidney L. Pressey. Mental Survey Scales. "Cross-out Tests." A Brief Group Scale for Measuring General Intelligence. Department of Psychology, Indiana University, Bloomington, Ind. Four simple tests (verbal ingenuity, logical judgment, arithmetical

ingenuity, and moral judgment) so arranged that the pupil shows that he has comprehended each part by striking out a single superfluous word. The author has recently issued norms for grades Low 4 to High 8.

21. Arthur S. Otis. Otis Group Intelligence Scale; Advanced Examination. World Book Company, Yonkers, N. Y. The oldest and perhaps the most widely used of the group tests of intelligence. The series consists of 10 tests, each containing from 20 to 30 tasks. (See JOURNAL OF EDUCATIONAL PSYCHOLOGY, Vol. 9, May and June, 1918, 239-261; 333-348.) They are following directions, opposites, disarranged sentences, proverbs, arithmetic, geometric figures, analogies, similarities, narrative completion, and memory. Suitable for use in grades 5 to 12.

22. F. N. Freeman and H. O. Rugg. The Chicago Group Intelligence Test. School of Education, University of Chicago. A series of five tests (opposites, number completion, proverbs, analogies, and best reasons) based on the Army Alpha Tests, and designed for use in grades 5 to 12. It is said that this test is to be withdrawn.

23. W. W. Theisen and Cecile White Flemming. A Group Classification Test. Teachers College, Columbia University. Eight tests (following directions, synonym-antonym, arithmetic, common sense, completion, analogies, number completion, and information) for use in grades 5 to 12.

24. Army Alpha Examination, designed by a committee of the American Psychological Association for use with recruits during the war. The examination consists of eight tests (following directions, arithmetical problems, practical judgment, synonym-antonym, disarranged sentences, number series completion, analogies, and information), based largely on the Otis tests. These tests were widely distributed at the close of the war, but are now superseded by the National Tests.

25. Lewis M. Terman. The Terman Group Test of Mental Abil ity. World Book Company, Yonkers, N. Y. Ten tests (information, best answer, word meaning, logical selection, arithmetic, sentence meaning, analogies, mixed sentences, classification, and number series) are designed for use with grades 7 to 12.

26. L. L. Thurstone. Psychological Examination for College Freshmen and High School Seniors. Carnegie Institute of Technology, Pittsburgh, Pa. A series of 168 exercises, including infor-

mation, verbal relations, completion, proverbs, number completion, true or false statements, and logical reasoning, arranged in cycle formation.

27. E. L. Thorndike. Thorndike Intelligence Examination for High School Graduates. Bureau of Publications, Teachers College, Columbia University. These are the well-known entrance examinations designed to supplement other entrance requirements at Columbia University.

28. David Camp Rogers. Group Tests of Intelligence. Published by the author at Smith College. There are 11 tests (logical conclusions, delayed recall of ideas, information, arithmetic problems, immediate recall of ideas, substitution, similar relations, completion, absurdities, following directions, and train of associations) designed for use with college freshmen.

29. M. R. Trabue and F. P. Stockbridge. The Mentimeter Tests, in "Measure Your Mind: The Mentimeter and How to Use It." Doubleday, Page & Co., 1920. A series of thirty tests, derived largely from tests already in common use, and arranged roughly in ascending difficulty and complexity, so as to be applicable to all persons from infants to university graduates. In the preface the claim is made that "the Mentimeter is the first comprehensive system of tests, applicable to the whole range of educational and industrial requirements, to be offered for general use."

30. A. A. Roback. Roback Mentality Tests for Superior Adults. Prepared by the author for Simmons College. The Fenway, Boston, Mass., 1920. Twelve tests for college students. They are abstraction, problem, analogy, relations, insertion, reference, opposites, acumen, subsumption, directions judgment, and cryptogram. Total working time, 185 minutes.

# DEPARTMENT FOR DISCUSSION OF RESEARCH PROBLEMS

*Conducted by LAURA ZIRBES*

**This department has a two-fold function. It aims to serve research workers as well as educators, whose work brings them in close contact with children in the schools. It hopes to accomplish this service by suggesting research studies, which will meet well-defined school needs.**

**In order that this service may be real and effective, the co-operation of research workers and school people is desired. Correspondence with reference to the following questions will be considered in selecting topics for future discussions.**

**a. Which of the studies proposed would help you to solve a practical problem?**

**b. What topics might well be added to this list? Replies may be addressed to: Miss Laura Zirbes, 646 Park Ave., New York City.**

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In the last issue of this Journal one research problem was discussed at some length in this department, while five other possible studies were suggested. Because of the recency of our request for correspondence bearing on the suggested topics, it will be impossible to select problems for discussion from this source, as we hope later to do.

The following suggestions grew out of recent articles in educational publications, to which reference is made in each case.

*Is the conscious co-operation of the child toward the attainment of known and concrete standards a factor which greatly affects improvement?* Carefully controlled motivation of this sort over long and short periods. Control groups. Before and after measurement with comparative studies of improvement. Studies for several school subjects and grades. Results of incidental instruction compared with that above described.

S. M. Lloyd and C. T. Gray. University of Texas Bulletin No. 1853. Reading in a Texas City: Diagnosis and Remedy. P. 47.

*What are the specific errors and difficulties of individual pupils in arithmetical learning and to what extent do they indicate that the necessary special bonds have been neglected?* Careful accounting and analysis of all errors made by a class during a year. Lo-

cating the gaps in training and instruction and revising them to suit individual or class needs as revealed by analytical study of errors.

Edward L. Thorndike. The Constitution of Arithmetical Abilities. Journal of Educational Psychology, Vol. 12, No. 1, P. 14.

*What are the limitations of Grade Standards and Age Norms in evaluating educational achievement?* Constructive suggestions. Multiple Standards. New use of mental age. Achievement age.

That this problem is on the minds of a number of workers is evidenced by the number of articles in which it is suggested.

J. C. Bell. Editorial, Journal of Educational Psychology, Vol. XI, No. 4, P. 230.

B. R. Buckingham and Walter S. Monroe. A Testing Program for Elementary Schools. Journal of Educational Research, Vol 1I, No. 2, P. 521.

Rudolf Pintner and Helen Marshall. A Combined Mental Educational Survey. Journal of Educational Psychology, Vol. XII, No. 1, P. 32.

*To what extent would retardation and double promotion be diminished by admitting pupils to first grade when they are mentally six years of age regardless of chronological age?* Would children of high and low I. Q.'s progress at similar rates? Are the current assumptions regarding mental growth valid?

Frank N. Freeman. Interpretation and Application of the Intelligence Quotient. Journal of Educational Psychology, Vol. XII, No. 1, P. 12.

# NEW PUBLICATIONS IN EDUCATIONAL PSYCHOLOGY AND RELATED FIELDS OF EDUCATION*

1. *A book on educational tests for teachers.*—A book on educational tests and measurements, simple and direct in treatment, and practical in aim, for use of the classroom teacher has been needed. G. M. Wilson and Kremer J. Hoke[1] have done an admirable work to fill this need. The volume is not merely a collection of norms and descriptions of all available tests, with a scattering of statistical information and suggestions with regard to remedying deficiencies, nor is it replete with technical disputes. While it is admitted that "the tests which are going to survive and show value in the next few years cannot be determined at this time," the authors have, in the case of most subjects, definitely recommended certain tests, for which directions for giving, scoring, and interpreting the results are given. The chief merits and deficiencies of other tests are briefly considered. For example, in treating spelling, the Ayres scale is recommended. A list of 20-40 words, selected from a list yielding about 70 per cent. correct spellings, should be dictated singly rather than in context. Definite, non-technical statements of computing, displaying and interpreting results follow, with some useful sugges tions with regard to use of the data. Practically no space is devoted to discussions of methods of teaching, but three or four useful books on teaching of spelling are recommended. The merits and deficiencies of the Buckingham Scale, Buckingham's Extension of Ayres Scale, the Iowa scale and the Rice, Starch, Boston, and Jones lists are briefly and effectively considered. The chapter is followed by a bibliography. In the case of handwriting, the authors favor the Ayres and Thorndike scales; in arithmetic, most attention is given to the Courtis, Series B, Stone Reasoning, Woody, Cleveland Survey, and the Boston Research Tests in fractions. Under reading, extended treatment is given to Thorndike's Scale Alpha 2, Courtis Silent Reading Test No. 2, Monroe's Standardized Silent Reading, Haggerty's Visual Vocabulary, and Gray's Oral Reading Test, while other tests are briefly considered. The Nassau County Supplement

[1]Wilson, G. M. and Kremer J. Hoke. *How to Measure.* New York: Macmillan, 1920 Pp. VII + 285.

and Willing Scales are described in the chapter on English composition, and directions for making up a local scale are given. A short chapter is devoted to Thorndike's Drawing Scale, another, to scales in history, geography, language, and music, and another, to high school subjects.

The inclusion of a chapter on the measurement of general intelligence is a most useful innovation. The elements of mental status and its bearing upon school attainment are briefly presented, and the teacher is instructed how to use the Trabue Language Scales, the Otis and the Haggerty tests as measures of intelligence. We are surprised that the National Tests were not included, and the treatment of the Stanford-Binet test is clumsy. It is unfortunate that this chapter is the least satisfactory in the book.

The chapter on statistical terms and methods is short. A merit of the volume is the avoidance of statistical terms and procedures, which, more than anything else, keep teachers from making friends with educational tests and scales. The final chapter deals with methods of grading pupils; the unreliability of conventional methods, and a dozen special advantages of standardized tests are given.

"We are now quite surely approaching a third stage of development, and that is the state in which the tests shall be thoroughly weighed and judged as to the fundamental considerations of curricula making involved, whether they are or are not testing desirable school products, and whether their use will or will not lead to better methods of teaching and better selection of subject-matter. In this stage, the standard tests will be used more and more for diagnosis of the weaknesses of individual pupils, more and more in testing the efficiency of methods of teaching. It is in this third stage that the rank and file of the teaching profession are necessarily involved."

This book will be of service in this movement. A. I. G.

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2. *A semi-popular book on intelligence.* It is a rare treat when a recognized authority tries, and succeeds, in describing the results of scientific work in popular form. Dr. Goddard[2] has succeeded in his small volume on human efficiency as determined by levels of intelligence. It will afford useful and interesting reading to a wide public who wish the outstanding facts and implications of mental testing, in a form devoid of technical devices and vocabulary. The

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[2]Goddard, Henry Herbert, *Human Efficiency and Levels of Intelligence.* Princeton: University Press, 1920. Pp. VII + 128.

first chapter considers the nature of intelligence, the methods of testing, the distribution of individuals, and uses that have been made of results. The results of intelligence testing in the army is summarily surveyed. Chapter two shows the influence of intelligence levels in industrial, educational, and social adjustment. A third chapter deals with delinquency and crime. As regards causes, the author cites an answer to the question, "Why does a child go wrong?" "Either because he does not know any better, or because he cannot help it." "The new thought in this connection is that we have only to extend these two principles in order to account for practically all of juvenile delinquencies and a large part of adult criminality." In addition to the influence of low mentality, mental diseases and "pure wickedness" as causes of crime, the treatment and investigation of treatment of criminals, bases upon mental status is suggested, with an account of plans of the Iowa Bureau of Juvenile Research in this connection. The final chapter, the relation of individual differences in intelligence to a democratic form of government, is discussed. "The intelligent group must do the planning and organizing for the mass, and our attitude toward the lower grades of intelligence must be philanthropic." A small percentage should be given institutional care, working at tasks within their limitations, and throughout the nation, educational and vocational adjustment should be made in terms of intelligence levels. The effects of such placement will be an increase in efficiency and happiness of the people, a reduction of delinquency, crime, prostitution, reproduction of the unfit, and social maladjustment. "Each mentality requires its own kind of life for its success and happiness."

If one does not keep in mind Dr. Goddard's preface, to the effect that "it seems worthwhile to solve our problems in terms of intelligence, as though it were the only variable," because the role of other factors is not well understood, one would feel that the influence of intelligence is exaggerated. The influence of emotional and temperamental traits, home and school advantages, etc., are considered largely as subsidiary. "While intelligence or mental level is not the sole factor in human efficiency, it is, nevertheless, the determining factor, and our social inefficiency is due primarily to the large percentage of low intelligence, and, secondly, to a lack of appreciation of relatively low intelligence by those of higher intelligence." P. 57.

The discussion of intelligence levels and school education is brief. Among the superior children are two groups: first, those who are truly gifted children, and, second, those whose brilliancy is evidently due to a very high-strung nervous system, cases of the "well known, but little understood relationships between genius and insanity." The reader will be disappointed to find no extensive discussion of these types, most emphasis, necessarily, no doubt, being given to the sub-normal groups. The choice of education and vocations for the latter is outlined. The educational guidance by early tests and selection by tests at high school and college entrance is endorsed. Finally, "Why should we not ascertain the grade of intelligence necessary in every essential occupation, and then entrust to that work only those people who have the necessary intelligence?" P. 118.

Technical matters, such as the validity of the Intelligence Quotient, are omitted. Certain charts and statements give the impression that the writer considers all individuals to have a constant growth, and "that *at any age* development may cease and the individual remain at that level the rest of his life." Whether this is literally meant could scarcely be determined by a reader unacquainted with other concepts on the field. That "the mental level is determined with marvelous accuracy by trained psychologists," and that "the results of the army testing is of profound significance," illustrates the optimistic spirit in which the book is written. It is, however, a very clear and most interesting account of the results and possibilities of intelligence testing. A. I. G.

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3. *A new textbook on fundamental principles of learning and study.*—Professor A. S. Edwards, University of Georgia, has written a book[3] directed primarily to college students of education, which is adapted as well to school principals and supervisors, and parts of it may be studied with profit by high school students. Accepting the word "habit" to express the acquisition of memories, skills, interests, and "all more or less permanent tendencies of mind and body," the author proceeds to discuss most of the topics within the field of learning. In general, the thesis is, that while all learning is habit formation, it should be of permanent value, and generalized improvement, as well as specific improvement, should be sought. The acquisition of ideals, habits of efficient thinking, working, memorizing, studying, of emotional control et al., are discussed in

[3]Edwards, A. S. *The Fundamental Principles of Learning and Study.* Baltimore: Warwick and York, 1920. Pp. 240.

turn. While the general principles are not most economically handled, the repetition in the application to the several types of mental work may be of advantage to the student. The book abounds in definite practical directions; two chapters in particular consist almost wholly of such admonitions as "Try to find an application for everything you learn," "Review frequently," "Have an intention to remember," "Learn at your own best rate," etc.

The book is neither a compendium of experimental studies on learning, nor a novel systematic treatise on principles. Quotations in abundance from James, Meumann, Thorndike, Judd, Sully, Angell, Carpenter, and others are included, but a great deal of experimental work of merit has not been drawn upon. It will be difficult for the student to distinguish principles based on experimental findings from the opinions of the author. However, it is a useful collection of suggestions with regard to methods of study, and in many respects has merits not possessed by popular books on "How to Study." Suggestions with regard to appropriate diet, humidity, temperature, change of work, sleep, naps, light, and the like are included.

A. I. G.

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4. *A report on the diagnosis and improvement of pupils' reading ability in a city school system.*[4]—Although the author's preface indicates that this bulletin was prepared especially for the use of elementary teachers of Texas, it will, no doubt, find a larger field of use. The entire literature of diagnosis and remedy as listed in chapter III and in the Bibliography is so meagre that it is well supplemented by a careful study of this sort.

From the available Reading Tests described in the first chapter two were chosen and used as described in chapter two.

The program of diagnosis and remedial work is described in detail in chapters four and five. The numerous charts and diagrams should make it quite possible for any teacher to make regular use of the procedures devised. That such use would prove profitable is indicated by the re-measurement and interpretation of final scores in tests given after four months of remedial work.

The final chapter on "Summary and Suggestions" gives illustrative records and practical suggestions of the sort which makes it possible

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[4]Lloyd, S. M. and Gray, C. T., Reading in a Texas City: *Diagnosis and Remedy* University of Texas Bulletin No. 1853.

for any average teacher to use the carefully planned technique. This is, no doubt, the greatest contribution of the study.

L. Z.

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5. *A college textbook on the social significance of human traits.*—"To give a bird's-eye view of the processes of human nature from man's simple unborn impulses and needs, to the most complete fulfillment of these in the deliberate activities of religion, art, science, and morals," is the rather large task accepted by a philosophic writer.[5] What we find is a rather loquacious discussion of innumerable aspects of human behavior, with a great deal of repetition. In Part I, 275 pages are devoted to "social psychology," in which man's instinctive equipment, prolonged infancy, the origin of language, the mechanism of habits, learning by trial and error, "deliberate learning," drill, fatigue, health, social inertia, conscious transference of habits, reflection, opinion, belief, character, will, the development of the self, individual differences, language and communication, racial and cultural continuity, and many other things are discussed. Part II devotes nearly 200 pages to the "Career of Reason" in the case of religious, artistic and aesthetic experiences, science and scientific methods, morals and moral valuations. The influence of the psychological writings of Thorndike, Woodworth, and McDougall, and the philosophical works of James, Dewey, and Santayama appears throughout. For the most part, the book attempts to explain and apply the principles advocated by these writers. There is but little new material that will be of interest to psychologists, and the book is not adapted specially to the needs of education. It will be found most useful as a text for an elementary course, combining psychology and philosophy, having been written primarily for use in a course entitled "Introduction to Contemporary Civilization," required of freshmen in Columbia College. It may be enjoyed by the mature general reader who lacks the time to read the several books from which the present volume is largely drawn.

A. I. G.

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6. *A study of women delinquents in New York.*—Probably the most intensive study of delinquency among women in described in

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[5]Edman, Irwin. *Human Traits and their Social Significance.* Boston: Houghton Mifflin. 1920. Pp. XIX + 467.

this large book,[6] written jointly by Mabel R. Fernald, Mary H. S. Hayes, Almena Dawley, and Beardsley Ruml. Some 550 cases were studied by use of the Yerkes-Bridges, Stanford-Binet, the Woolley general intelligence tests, educational performance, and other tests by a staff of psychologists. Social investigators secured family histories, school records, hospital, institutional, criminal, and vocational histories, and a detailed account of circumstances preceding and following offenses. Information concerning habits of addiction to drugs, alcohol, and tobacco was secured. The most important findings relate to educational attainment, mental levels, early home conditions and occupational history and efficiency. As regards educational attainments, the mean grade reached is 4.5, with about 15 per cent finishing the eighth grade and 1.6 per cent finishing high school. Eleven per cent had received no regular schooling. Educational tests showed a group median about equal to that of the fourth grade. The intelligence rating by the Stanford-Binet gave a mean of 11.8 years, which may be compared to 13.4 years, the mean of an army group. Delinquent women apparently are, as a group, somewhat inferior to the general public, in both intelligence and school attainments, but the overlapping is so great, and the increase of the delinquent tendencies so slight with a decrease in intelligence, that other important causes must be sought. The results of the social and economic histories and surveys led the authors to the following conclusion as regards causation: "A somewhat inferior intellect," coupled with poor economic background, with few advantages and opportunities, including such conditions as poor homes, bad company, limited schooling, early age of starting to work, and no useful industrial training at length becomes involved in economic straits from which prostitution, theft, etc., offers a most convenient escape. More than many early writers, especially psychologists, the authors are inclined to emphasize the role of environmental influences, rather than constitutional limitations, as the cause of delinquency. A. I. G.

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7. *A book on physical growth by a French writer.*—Mr. S. L. Eby states that his purpose in translating Dr. Godin's book from the French is, first, to introduce the writings of a Frenchman who has

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[6] Fernald, Mabel R. Hayes, Mary H. S. Dawley, Almena, and Ruml, Beardsley. *A Study of Women Delinquents in New York State.* New York: The Century Co., 1920. Pp. XVIII + 541.

long been a student of scientific education, and, second, to direct greater attention to the contributions to the theory and practice of education in France.[7] Dr. Godin's point of view is admirable:

> "The only physical measurements worth while are those which admit of comparisons with previous states of development of the same individual. Such comparisons can be valid only when repeated measurements are taken at regular intervals. These repeated measurements are necessary in order to enable the teacher and educator to know the child intimately and profoundly; it makes possible a degree of individualization of education unknown in the past."

In order not to lose the variations in "rhythm" and alternation in growth, measures are taken semi-annually. Emphasis is placed upon the fact that gross measures mean little unless broken up by finer analysis. Growth is not uniform, but proceeds with variations in the case of the limbs, trunk, and head. The book includes many charts and diagrams illustrating segmental development from birth to puberty.

Part I is devoted to a discussion of the nature of growth, and Part II applies the results to education. No actual data are given, a fact which makes the volume seriously unsatisfactory. As regards applications to education, many of them are most curious, for example, the following:

> "The trunk is cubed by the product of the multiplication of its dimensions. * * * The product of this double multiplication is called V (Viscera). V varies enormously from birth to adult age, and it is expressed by a different figure at each of the stages of growth. * * * It is the same with the product of C of the double multiplication of the diameters of the cranium, of which the content is the encephelon, the brain, consequently. The relation of C to V gives a quotient which instructs us on the relative proportions of the viscera, of the vegetative life, and of those of the psychic life. The quotient informs the educator of the free field which the individual vegetative resources for cerebral culture leave to him."

A. I. G.

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[7]Godin, Paul. *Growth during School Age; its Applications to Education.* Translated by Samuel L. Eby. Boston: Richard G. Badger. 1920. Pp. 268.

8. ***A condensed guide for the Stanford Revision of the Binet Tests and Abbreviated Filing Record Card.***—Professor Terman[8] has published a guide for use of his revisions of the Binet tests which is convenient to carry and arranged for fluency of reading in that the material to be spoken to the subject is printed in black-face type, while the notes of interest to the examiner are printed in light type. No significant changes in procedure appear. All the essentials for giving and recording the tests are now printed on a single card,[9] typewriter size, which is economical of space and more convenient for filing. A. I. G.

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9. ***A monograph which evaluates the present status of home economics in our schools.***—The first step in the reconstruction of a curriculum is the thorough evaluation of the existing situation. In the past five years much of this evaluative work has been done in elementary and junior high school subjects. Careful reports have been made on reading, handwriting, spelling, arithmetic, and ninth-grade mathematics. Many unpublished analyses are to be found on the shelves of our educational libraries. To the present time, no such evaluation has been available for home economics.

A series of careful studies in this field has just been published in one of the "University of Chicago Supplementary Educational Monographs."[10]

These studies were made under the direction of Dr. H. O. Rugg by members of the departments of home economics in the University of Chicago and in the Iowa Agricultural College.

The surveys include a quantitative study of existing courses in elementary and secondary schools; a minute analysis of the text-books, by which so much of the teaching is controlled, and a careful canvass of the literature of the subject in search of definite aims and objectives; in addition, a preliminary organization of tests for measuring skill in machine sewing, tests for content in textiles and clothing, and a suggestive program for the reconstruction of the curriculum in home economics.

The authors report that a thorough examination of 67 of the city public school courses shows that "home economics" means in nearly

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[8]Terman, Lewis M. *Condensed Guide for the Standard Revision of the Binet-Simon Intelligence Tests.* Boston: Houghton Mifflin Co. 1920. Pp. 32.

[9]Terman's *Abbreviated Filing Record Cards,* published by Houghton, Mifflin Co., Boston.

[10]Rugg, H. O., in collaboration with the departments of home economics in the University of Chicago and in the Iowa Agricultural College, *"Home Economics in American Schools."* Chicago: University of Chicago, 1920. Pp. X + 133.

all cases merely cooking and sewing. The courses are organized formally, with practically no attention to subject-matter sequence or to learning difficulty. Conclusions concerning the organization of home economics curricula were derived by evaluating the course against the four following psychological criteria:

1. "To what extent does the home-economics curriculum provide for worthwhile home-making 'skills'?
2. "Is the time of children in home economics classes devoted to acquiring information of social value?
3. "Is sufficient opportunity provided for young people to develop powers of critical judgment—that is, analytical thinking?
4. "Are we so planning our curriculum and organizing our class exercises in home economics that there is promise that the instruction will eventuate in real ability to appreciate and enjoy?"

On the basis of such definite measures, and on definite principles of selection and arrangement of subject-matter, the writers report that, "information giving and the development of technique dominates the course," and that the primary importance of training children in judgment and appreciation is lost sight of. An investigation shows by a tabular analysis of the 19 most frequently used text books that the books and the courses are so encyclopedic and so unpsychologically arranged that it may fairly be said that children's learning is inhibited rather than promoted.

Purposes are scrutinized in five sources in the literature, in the same objective way, and with similar conclusions: that purposes are inadequate as revealed by the emphasis on the mastery of information and technique. The report follows this sweeping criticism by a constructive statement of new purposes for teaching: that is training power of thinking and enjoyment.

The writers next show that of two the effective methods by which a sound scheme of instruction in home economics can be organized, the first is the statement of outcomes; that the second is the design and use of standardized measures of instruction. They report new tests for results in textiles, dress designs, sewing, and house-planning, and new scales for measuring skill in machine sewing. Finally, the report presents a program for improvement through the scientific study of home economics education.

10. Professor Hanus has just published in book form[11] a series of essays, largely in the field of school administration, which have appeared in various educational periodicals during the past nine years. The volume is intended to "help the superintendent of schools, and other persons who are charged with the responsibility of providing good schools and school systems for the public, to formulate and justify their opinions and procedure."

The material that is primarily administrative is found in the first three essays. These deal critically with the problem of educational aims in a school system; with a definite statement of fundamental principles, which every superintendent who seeks to define his administrative policy needs to assimilate; and with the aims, scope, and method of town and city school reports. The fourth essay directs at the superintendent questions concerning the efficiency of his school system, which it would be well if each school executive applied perennially to his own schools.

Professor Hanus's activity in the scientific field in education is reported in two essays, one dealing with his use of the Courtis Arithmetic Tests with business employees, and the other his pioneer attempt to devise a test for ability in high school Latin. Another essay treats with the field of state school administration.

The volume closes with three essays which critically compare educational aims and practices in Germany and the United States.

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## III. Additional Publications Received.

### A. Mental and Educational Tests.

Haggerty, M. E. *Reading Examination.* Sigma 1 and Sigma 3. Yonkers: World Book Co., 1921.

Holley, Charles E. *Mental Tests for School Use.* Urbana: University of Illinois, 1920. Pp. 6 + 91.

Hudelson, Earl. *Hudelson English Composition Scale.* Yonkers: World Book Co., 1921. Pp. VII + 46.

Seashore, Carl E. *A Survey of Musical Talent in the Public Schools.* Iowa City: University of Iowa, 1920. Pp. 36.

Van Wagenen, Marvin J. *Historical Information and Judgment in Pupils of Elementary Schools.* New York: Teachers College, Columbia University, 1919. Pp. 74.

Williams, J. Harold. *A Survey of Pupils in the Schools of Bakersfield, Cal.* California: Whittier State School, 1920. Pp. 43.

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[11] Hanus, Paul H. *School Administration and School Reports.* Boston: Houghton, Mifflin Company, 1920. Pp. XI + 200.

B. PUBLICATIONS IN THE GENERAL EDUCATIONAL FIELD.

COLLEGE TEACHERS OF EDUCATION. *Studies in Eduction.* Iowa: Tribune Publishing Co., 1920. Pp. 32.

JOHANSEN, F. O. *Projects in Action English.* Boston: Badger, 1920. Pp. 207.

NORTH CAROLINA: STATE EDUCATIONAL COMMISSION. *Public Education in North Carolina.* New York: General Education Board, 1920. Pp. X + 137.

REED, ANNA Y. *Junior Wage Earners.* New York: MacMillan Company, 1920. Pp. XII + 171.

STOCKTON, J. L. *Project Work in Education.* Boston: Houghton Mifflin Company, 1920. Pp. XIV + 167.

TRUEMAN, G. J. *School Funds in the Province of Quebec..* New York: Teachers College, Columbia University, 1920. Pp. 154.

WOODY, THOMAS. *Early Quaker Education in Pennsylvania.* New York: Teachers College, Coumbia University, 1920. Pp. 287.

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C. NEW SCHOOL TEXTBOOKS.

FOX, D. R. *Atlas of American History.* New York: Harper & Bros., 1920. Pp. 181.

GRISCOM, E. *Americanization.* New York: MacMillan Company, 1920. Pp. 255.

TRAUSEAU, E. N. *Science of Plant Life.* Yonkers: World Book Co., 1921. Pp. IX + 336.

SAIT, E. M. *Government and Politics of France.* Yonkers: World Book Co., 1920. Pp. XV + 478.

WASHBURNE, C. W. *Common Science.* Yonkers: World Book Co., 1920. Pp. XV + 390.

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D. PUBLICATIONS OF UNITED STATES BUREAU OF EDUCATION.

BONNER, H. R. *Statistics of Public High Schools 1917-1918.* Bulletin 19, 1920. Pp. 192.

BONNER, H. R. *Statistical Survey of Education, 1917-1918.* Bulletin 31, 1920. Pp 48.

BONNER, H. R. *Private Commercial and Business Schools, 1917-1918.* Bulletin 47, 1919. Pp. 123.

COMMISSIONER OF EDUCATION. *Annual Report.* 1920. Pp. 134.

*Home Economics Courses of Study for Junior High Schools.* Home Economics Circular 9, 1920. Pp. 14.

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E. MISCELLANEOUS PUBLICATIONS.

BAMESBERGER, V. C. *Standard Requirements for Memorizing Literary Material.* Urbana: University of Illinois, 1920. Pp. 93.

GALLOWAY, T. W. *The Sex Factor in Human Life.* New York: The American Social Hygiene Association. Pp. 56.

*Preliminary Synthesis and Integration of the Returns of the Sex Education Conference.* New York: The American Social Hygiene Association. Publication 321. Pp. 95.

STINCHFIELD, S. M. *Preliminary Study in Corrective Speech.* Iowa City: University of Iowa, 1920. Pp. 36.

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